
Ayuntamiento de

THE NAVAL ANNUAL

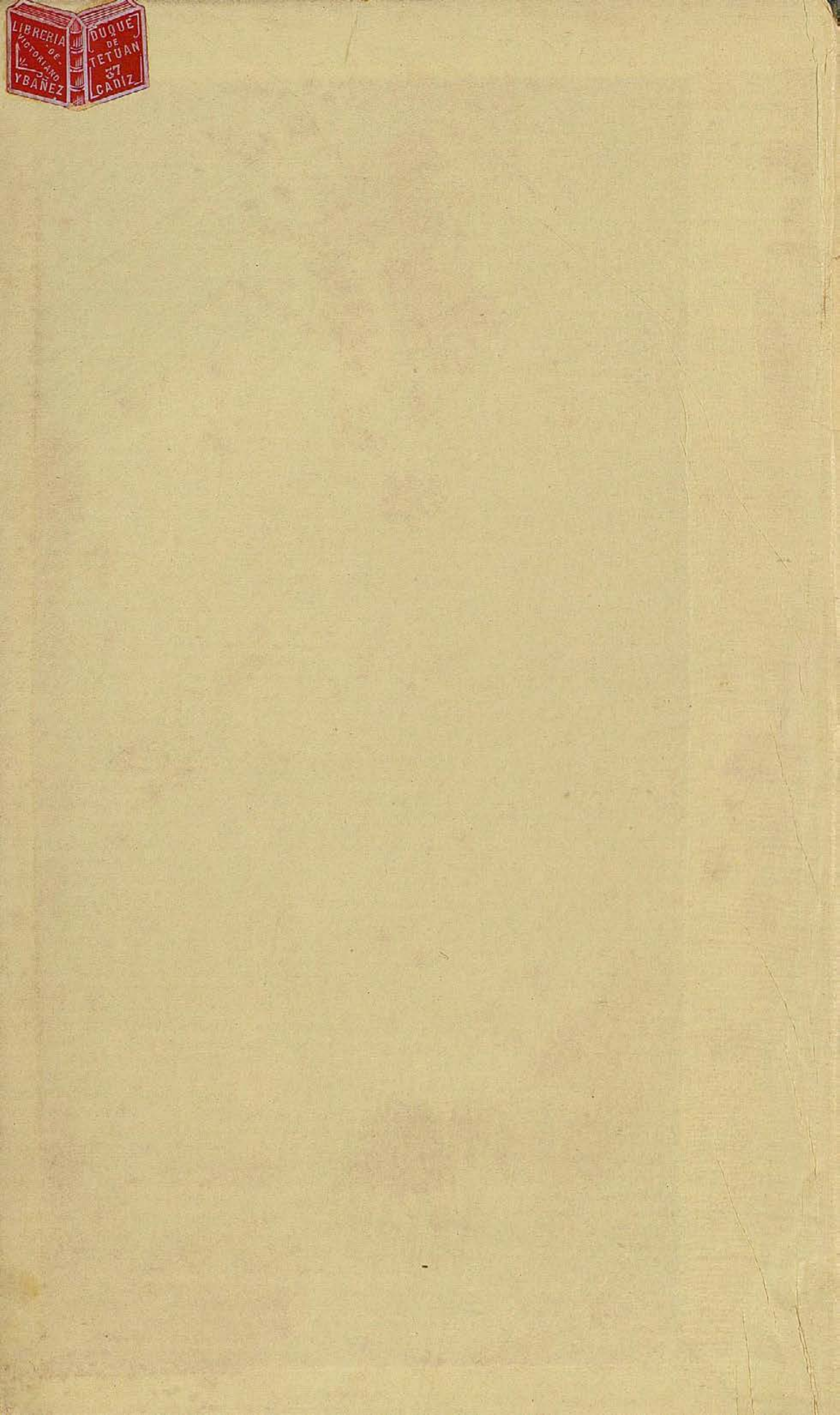
T. A. BRASSEY

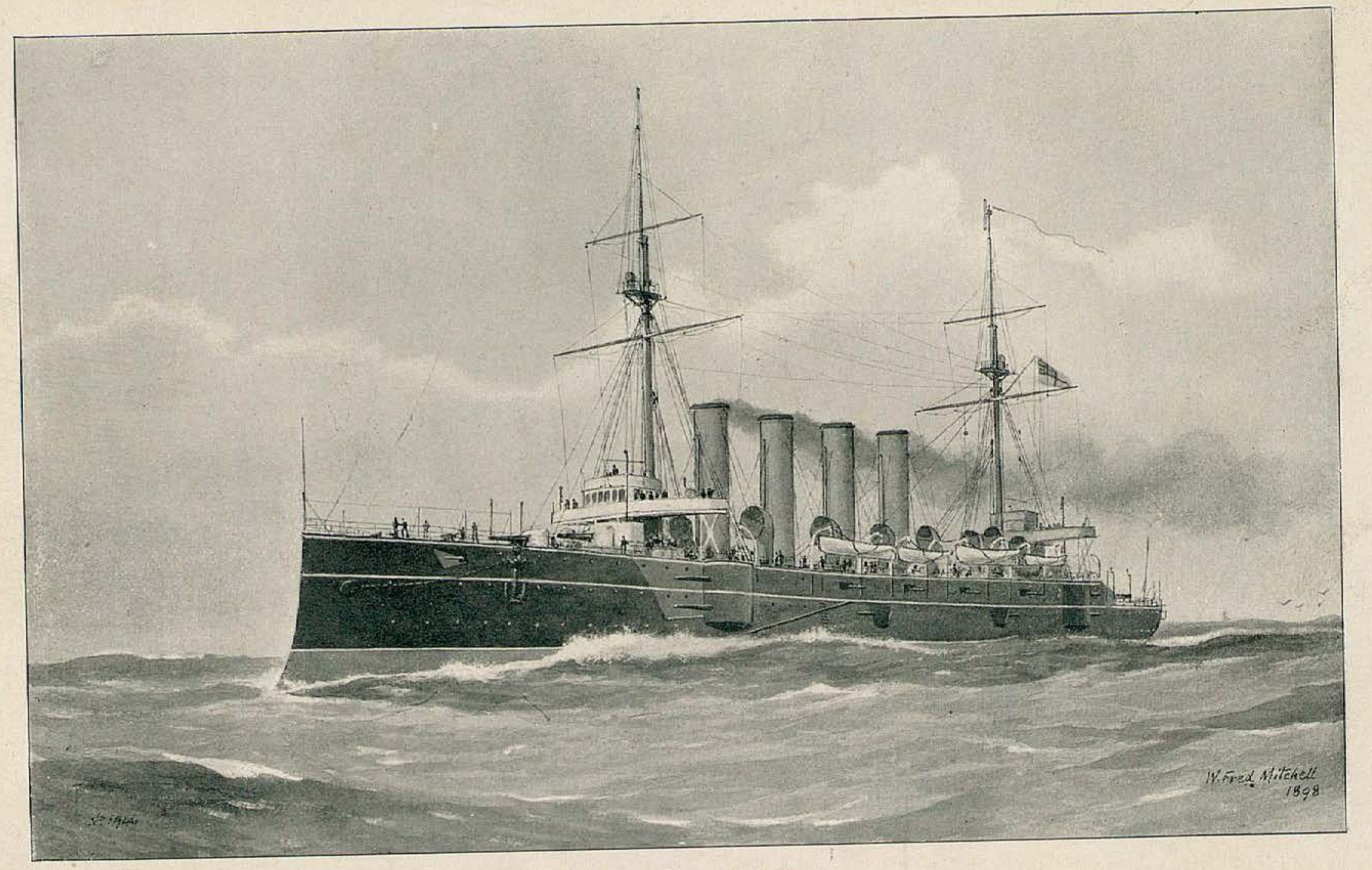


[illegible] YEAR OF PUBLICATION



J. GRIFFIN & Co. PORTSMOUTH


LIBRERIA
DE
VICTORIANO
YBAÑEZ
DUQUE
DE
TETUAN
37
CADIZ



H. M. S. "DIADEM."

THE

NAVAL ANNUAL,

1898.

EDITED BY

T. A. BRASSEY.

PART I.—Lord BRASSEY, K.C.B.; Colonel Sir GEORGE CLARKE, K.C.M.G., F.R.S.; Commander C. N. ROBINSON, R.N.; Captain C. ORDE BROWNE; Lieutenant A. STROUMILLO, Russian Navy; Messrs. G. R. DUNELL, C. GLEIG, J. R. THURSFIELD, E. WEYL, and the EDITOR.

PART II.—Lists of Ships: Commander C. N. ROBINSON, R.N.; J. LEYLAND; Plans: S. W. BARNABY, M.I.N.A.

PART III.—Captain ORDE BROWNE, late R.A., Lecturer on Armour to the R.A. College.

PART IV.—OFFICIAL STATEMENTS and NAVAL ESTIMATES.

1898.

PORTSMOUTH:

J. GRIFFIN AND CO., 2, THE HARD.

(STATIONERS BY APPOINTMENT TO HER MAJESTY AND H.R.H. THE DUKE OF EDINBURGH.)

London Agents: SIMPKIN, MARSHALL & CO.

Foreign Agents:

PARIS: BOYVEAU & CHEVILLET, 22 RUE DE LA BANQUE.
NEW YORK: VAN NOSTRAND. BERLIN: W. H. KÜHL.
HONG KONG, SHANGHAI, AND YOKOHAMA: KELLY, WALSH & CO.
TOKIO: Z. P. MARUYA & CO.

H.M.S. "DIADEM."

THE

NAVAL ANNUAL,

1898.

EDITED BY

T. A. BRASSEY.

PART I.—Lord BRASSEY, K.C.B.; Colonel Sir GEORGE CLARKE, K.C.M.G., F.R.S.; Commander C. N. ROBINSON, R.N.; Captain C. ORDE BROWNE; Lieutenant A. STROUMILLO, Russian Navy; Messrs. G. R. DUNELL, C. GLEIG, J. R. THURSFIELD, E. WEYL, and the EDITOR.

PART II.—Lists of Ships: Commander C. N. ROBINSON, R.N.; J. LEYLAND; Plates: S. W. BARNABY, M.I.N.A.

PART III.—Captain ORDE BROWNE, late R.A., Lecturer on Armour to the R.A. College.

PART IV.—OFFICIAL STATEMENTS and NAVAL ESTIMATES.

1898.

PORTSMOUTH:

J. GRIFFIN AND CO., 2, THE HARD.

(BOOKSELLERS BY APPOINTMENT TO HER MAJESTY AND H.R.H. THE DUKE OF EDINBURGH.)

London Agents: SIMPKIN, MARSHALL & CO.

Foreign Agents:
PARIS: BOYVEAU & CHEVILLET, 22 RUE DE LA BANQUE.
NEW YORK: VAN NOSTRAND. BERLIN: W. H. KÜHL.
HONG KONG, SHANGHAI, AND YOKOHAMA: KELLY, WALSH & CO.
TOKIO: Z. P. MARUYA & CO.

LONDON:
PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
STAMFORD STREET AND CHARING CROSS.

PREFACE.

In spite of the fact that new competitors are springing up all over the world—Italy and Greece now possess their Naval Annuals—it is very satisfactory to find that our last edition was sold out by the end of February, 1898.

In continuance of the plan started three years ago, we give this year an account of the Russian Navy. It is contributed by Lieut. A. Stroumillo, of the Russian Imperial Navy, who is at present employed in the Admiralty at St. Petersburg, with the kind permission of the Russian Minister of Marine, to whom our best thanks are due. Next year we hope to give an account of the United States Navy. Commander Robinson has at last been able to complete his series of articles on Naval Reinforcements in War Time. He deals this year with the British private establishments for the manufacture of Armour and Ordnance. Sir George Clarke's treatise on scouting, we trust, will lead to a closer study of this important subject amongst the general body of Naval officers. The question of our food supply in war time, which is treated by Mr. Gleig, demands more attention than has hitherto been given to it. Mr. Dunell, Mr. Thursfield and Mr. Weyl remain responsible respectively for the review of Marine Engineering, Naval Manœuvres and the progress of Foreign Navies. Our readers will be glad to see that Lord Brassey has been able to contribute a review of the present position of the Navy.

In Chapter I. we have felt it our duty to draw attention with greater emphasis than before to our recent second-class cruisers, and to compare them as to speed and armament with cruisers lately built at Elswick. In doing so, we feel that the requirements of our Naval men as to fittings, etc., do not leave a free hand to the Director of Naval Construction. We believe that a compromise must exist between the Elswick and our own second-class cruisers, and that Sir William White is the man to find it. The armament of the newest second-class cruisers, we are glad to say, is to be much improved. The manning proposals of the Estimates for 1898-99 we consider so unsatisfactory that the question is dealt with at greater length than usual. From a national, if not from a naval point of

view, it is of great importance that steps should be taken to check the diminution of British Seamen in the Mercantile Marine by instituting a scheme of state-aided apprenticeship, which would supply trained seamen not only to the Merchant Service but to the Naval Reserve. There is little doubt that a strong body of Naval Reserve men can be recruited in the Colonies, provided official objections can be overcome.

With the object of increasing the number of the plates in Part II. without increasing the size of the book, it has been decided to gradually reduce the whole of the plates to half size, a change which we trust will be appreciated. Mr. Sydney Barnaby, son of Sir Nathaniel Barnaby, at one time Director of Naval Construction, has taken charge of the plates in place of Mr. Barnes.

Mr. Barnes has been connected with the *Naval Annual* since the commencement of the undertaking, and for his loyal co-operation the Editor and his father owe him their very best thanks. Though no longer responsible for any section of the work, he has kindly given us his valuable advice and assistance with the present volume.

In conclusion, we must thank many British and foreign shipbuilders for kindly supplying us with information. We are indebted to the *Times* and other newspapers for the reports of trials, descriptions of ships, etc. For certain information we have drawn as usual on the admirable Austrian *Marine Almanack*.

CONTENTS.

PART I.

PART II.

TABLES OF BRITISH AND FOREIGN SHIPS.

TORPEDO-BOAT TABLES (p. 348).

Commander C. N. Robinson, R.N., and John Leyland.

PLANS OF BRITISH AND FOREIGN SHIPS.

Sydney W. Barnaby, M.I.N.A.

PART III.

Captain Orde Browne, late R.A.

PART IV.

LIST OF ILLUSTRATIONS.

DIAGRAM.

PART I.

CHAPTER I.

The Progress of the British Navy.

The Navy Estimates for 1897–8 amounted to £21,838,000, or nearly the same total as the Navy Estimates for 1896–7. The principal items of increase were £276,200 in the wages vote, owing to the addition of 6300 to the *personnel* of the Navy and £131,800 in the vote for Naval armaments. On the other hand, there was a decrease of £511,000 in the shipbuilding vote, which still reached the large figure of £10,829,864, of which, over £7,100,000 were to be devoted to new construction.* But in consequence of the dispute in the engineering trade the sum short-spent on new construction amounts to £2,270,000. In view of the efforts that are being made in France, Germany, Russia, and the United States to increase their Naval strength, the delay in carrying out the shipbuilding programme is most unfortunate. The chief event of the year was the Jubilee Review at Spithead. It had probably no inconsiderable influence in bringing about the introduction of the Naval Septennate in Germany and the new shipbuilding programme in France. The question whether the Navy is sufficient for our needs is considered at length in a later chapter; but it may be observed here that, while the Navy increases in strength year by year, it is tending to lose its predominant position owing to the large additions to the strength of so many foreign Navies. There must be no reduction in the sums devoted annually to new construction. We may have to face an increase in the expenditure under this head, and to do this we must be careful of expenditure on things not vital to Naval supremacy. The present policy of providing for manning the large additions to the Navy almost entirely by increasing the permanent force is, as we have always maintained in these pages, wasteful of the national resources. The wisdom of some of the expenditure under the Naval

* Of the supplementary vote for £500,000 passed in July, £400,000 was devoted to new construction affecting the figures given above.

Works Acts and on the fortification of the Scilly Islands, of Falmouth and of Lough Swilly under the Military Works Act, is at least open to question.

Ships completed.

The dispute in the engineering trade, while it has affected most seriously the ships in the earlier stages of construction, has prevented the completion during the present financial year of one battleship, three first-class cruisers, two second-class cruisers, and six third-class cruisers, and twenty 30-knot destroyers. In spite of this, the additions to the fighting strength of the Navy are most important. Including the Hannibal, Illustrious and Diadem, which have been through their trials and will probably be ready for sea by the time the *Annual* is published, they comprise the remaining five battleships of the Spencer Programme, one first-class cruiser, the remaining two second-class cruisers of the Eclipse type, the Arrogant, besides twenty-five of the 30-knot and most of the remaining 27-knot torpedo-boat destroyers.

Battleships.

The battleships completed, or practically completed, are the Mars, Jupiter, Hannibal, Cæsar and Illustrious. The two first were finished in time to take part in the Jubilee Review. The Cæsar is also in commission. These ships belong to the Majestic class, of which no further description is necessary in these pages. We give below the results of the trials—not already published in the *Annual* —for what they are worth, gleaned from the *Times* and other sources :—

Eight Hours Natural Draught Trials.

	Mean Draught.	Air Pressure.	Total I.H.P.	Mean Revolutions.	Speed.
Cæsar . . .	26 ft.	·27 in.	10,630	96·0	16·7
Hannibal . .	25 ft. 3 in.	·26 in.	10,357	97·0	16·3
Mars . . .	25 ft.	·21 in.	10,159	98·0	15·96
Illustrious . .	26 ft. 3 in.	—	10,241	96·5	15·96

Four Hours Forced Draught Trials.

Cæsar . . .	26 ft.	·78 in.	12,652	101·8	18·7
Hannibal . .	25 ft.	—	12,138	103	18
Mars . . .	25 ft.	·78 in.	12,434	104·2	17·7
Illustrious . .	26 ft.	—	12,112	99·5	16·5*

Thirty Hours Coal Consumption Trials.

	Mean Draught.	Total I.H.P.	Mean Revolutions.	Speed.	Coal per I.H.P. per hour lbs.
Cæsar . . .	25 ft. 7 in.	6309	87·8	14·8	1·93
Hannibal . .	25 ft. 4 in.	6124	84·0	14·6	1·78
Mars . . .	—	—	—	—	—
Illustrious . .	26 ft.	6155	83	14·5	1·77

The Illustrious, like the Magnificent, is fitted for induced draught.

* Boisterous weather affected the speed.

Her natural draught trials had to be postponed owing to the break-down of the induced draught fans, which caused considerable damage, and the first forced draught trial was unsatisfactory owing to the priming of the boilers.

The first-class cruiser Terrible was not completed till shortly before the Jubilee Review, but a full description of her trials was given last year. The Powerful has made the passage round the Cape of Good Hope to the China station, where she will find the Rurik and Rossia. It is to exaggerated apprehensions of the power of these two vessels that the construction of the Powerful and Terrible is due. The writer has had the opportunity of visiting all four ships. Both Russian ships carry a powerful armament, which in the Rurik is quite unprotected, while in the Rossia some protection is given by light screens between the guns on the main deck. The Powerful and Terrible carry a small armament for their huge size, but it is well distributed and well protected. They have enormous coal-capacity—3000 tons—which might be necessary enough for the cruisers of a Power which has no coaling-stations, but appears exaggerated in our case. Their dimensions deny to them most of the docks and several of the ports of the world, and they require a complement of not far short of 900 men. The machinery of the Powerful has given considerable trouble, and the stoke-hold and engine-room space is said to be cramped. Though we have always protested against the construction of these monster cruisers, it is with sincere regret that we say that they will probably prove the Shah and Inconstant of their day. Terrible.

Four first-class cruisers of 11,000 tons were laid down in 1895–6 and four in 1896–7. Of these the Diadem was launched at Fairfield on September, 1896, and has completed her trials.* The results were as follows:— First-class cruisers. Diadem.

	Full Power.	30 hour coal consumption.
Mean draught	25 ft. 4 in.	25 ft. 4 in.
Steam in boilers	291 lbs.	280 lbs.
I.H.P.	17,188	12,776
Mean revolution	119·1	107·6
Speed	20·6	19·79
Coal per I.H.P. per hour	1·77 lbs.	1·59 lbs.

On the full-power trial three runs were made on the 23 miles course off Dodman's Point, with the results given above. On the trial, with only 24 out of her 30 boilers in use, forced draught was employed, but the air-pressure only amounted to 0·3 in. With 291 lbs. of steam in the boilers, the mean revolutions were: 116·3; I.H.P., 15,861; and the coal consumption 1·95 lbs. per I.H.P. per

* For full particulars, *cf.* p. 218, *et seq.*

hour. The *Times* remarks:—"The trial fully demonstrated that should one boiler compartment be disabled in action, the design power of the ship could still be reached, and though the trial was limited to four hours it was evident that the engines and the ship could have stood the test for a considerably longer period. It was also shown by the result of the trial that in no ship has such high evaporative efficiency been realised from the Belleville boiler."

Whether it is true or not that "power on the sea has been transferred rather to cruisers than to battleships," it is to cruisers, Mr. Goschen tells us, that we are directing our main attention, and it will be of interest to compare the cruisers building for the British Navy with some of the numerous large cruisers building for foreign Powers:—

FIRST-CLASS CRUISERS.

	British.	French.	German.	Chilian.	Japanese.
	DIADEM.	MONTCALM (6).	FURST BISMARCK.	O'HIGGINS.	AZUMA.
Displacement.	11,000	9,367	10,482	8,500	9,436
Length . .	435	452 ft. 9 in.	393 ft. 6 in.	411 ft. 9 in.	445 ft. 10 in.
Beam . . .	65	63 ft. 8 in.	67	62 ft. 6 in.	59 ft. 6 in.
Draught aft .	26	24 ft. 7 in.	26 ft. 3 in.	..	28 ft.
I.H.P. . . .	16,500	19,600	14,000	16,500	17,000
Speed . . .	20½*	21	19	21¼	20
Protection:—					
Belt . . .	..	6″	7¾″	7″	6″
Deck . . .	3″—6″	..	3″	2″	
Gun positions	4½″	..	7¾″	6″	
Armament (all Q.F.) .	16 6 in. 14 12 pr. 3 3 pr.	2 7·5 in. 8 6·3 in. 4 3·9 in. 16 1·8 in. 6 1·4 in.	4 9·6 in. 12 5·9 in. 10 3·6 in. 10 1·6 in. ..	4 8 in. 10 6 in. 4 4·7 in. 10 12 pr. 10 6 pr.	4 8 in. 12 6 in. 12 3 in. 12 1·8 in.
Torpedo tubes	3	2	6	3	5
Coal supply .	1,000 / 1,900	1,020 / 1,600	1,000	1,200	

The Diadem carries twelve of her sixteen 6-in. quick-firing guns in casemates of 4½-in. armour, two on the poop, and two on the forecastle behind shields. The Montcalm carries her 7·5-in. guns mounted singly in 6-in. turrets, and her eight 6·3-in. guns also mounted singly in casemates. The Furst Bismarck has her four 9·6-in. guns mounted in pairs in 8-in. turrets, and her twelve 5·9-in. guns singly in armoured casemates and turrets. The O'Higgins carries her four

* The speed of the improved Diadems is 20¾ knots with 18,000 I.H.P.

8-in. quick-firing guns in barbettes of 6-in. armour, with gunhouses of the same thickness, and six of the 6-in. guns in 6-in. casemates. The Azuma has her 8-in. quick-firing guns also mounted in pairs in armoured turrets—eight of the 6-in. guns in casemates and the remainder on the upper deck. Though the Diadem carries no guns above 6-in. calibre her armament does not compare unfavourably with that of the other ships; it is certainly more powerful than that of the Montcalm.

As regards protection for the hull, the Diadem depends on a thick armoured deck, while the other ships have a belt varying from 6-in. to 8-in. in thickness. In view of the development of shell-fire, armour on the side of the ship rather than inside is to be preferred.

In speed and in coal capacity the Diadem may be said to hold her own with the other ships. The O'Higgins gives the best result for her size. She is as well protected and as powerfully armed as any of the ships with which she is compared. She is the fastest of all, and her coal supply is adequate.

Second-class cruisers

The second-class cruisers Dido and Isis have been completed: displacement, 5600 tons; estimated speed, 19·5 knots. On her natural draught trials the Dido steamed 19 knots with 8339 I.H.P., and on her forced draught trials, 20·1 knots with 9863 I.H.P. The trials of the Isis were given last year. Several of the Eclipse class are now in commission on foreign stations.

Arrogant

Three of the four second-class ram-cruisers—the Arrogant, Furious, and Gladiator—were to have been completed during the year. They are of 5800 tons displacement, 10,000 H.P., and 19·25 knots speed. They have already been described in these pages, but their special features may be recalled. They possess great manœuvring power, and their bows are covered with 2-in. plating, and strengthened for ramming; but whether these features compensate for their feeble armament and indifferent speed is more than doubtful. On her eight hours full power trial the Arrogant steamed 19·6 knots, with 10,290 I.H.P., and 140·8 revolutions. The mean draught on trial was 21 ft., her load draught being 22 ft. On a thirty hours trial, at 2057 mean I.H.P., the speed was 12·48 knots, and the coal consumption 2·1 lbs. for the main engines, and 2·8 lbs. including the auxiliary engines.

The second-class cruisers of the Eclipse and Arrogant classes have been often criticised in these pages for their feeble armament and indifferent speed. They are for their size very inferior in these respects to the cruisers designed by Mr. Philip Watts, who is not hampered like Sir William White by Admiralty restrictions. The following Elswick cruisers, which are from 900 to 1500 tons

smaller than the British ships, have as good deck protection and as good coal carrying capacity. In speed, which is the principal requisite for a cruiser, they possess a superiority of from 3 to 4 knots, and in armament they are in no case inferior and in most cases greatly superior to the Eclipse and Arrogant. There is a great improvement shown in the armament of the Hermes and her two sisters. That the speeds of the Elswick ships are no more "paper speeds" than those of the British ships is evidenced by the fact that the Buenos Aires, although her bottom had not been cleaned since she left Newcastle in March, 1896, recently ran for some hours with natural draught at 22 knots.

	Eclipse.	Hermes.	Buenos Aires.	Blanco Encalada.	Yoshino.	Takasago.
Displacement .	5,600	5,600	4,740	4,400	4,150	4,300
Speed . . .	19·5*	20 (Est.)	23·2	22·78	23	24 (Est.)
Armament, all Q.-F.	5 6 in. 6 4·7 in. 9 12 pr. 1 3 pr.	11 6 in. .. 8 12 pr. 3 3 pr.	2 8 in. 4 6 in. 6 4·7 in. 16 3 pr. 8 1 pr.	2 8 in. 10 6 in. 12 3 pr. 12 1 pr.	4 6 in. 8 4·7 in. 22 3 pr.	2 8 in. 10 4·7 in. 16 3 pr.

How is it that the Elswick ships have much greater speed and carry such a powerful armament on a smaller displacement than our cruisers? No one but a trained Naval constructor could give a satisfactory answer to this question, and even he would need to know secrets that are locked in the bosom of the Elswick firm and of the Admiralty. The writer, who has no claim to be considered an expert, suggests that the answer may be found in the facts that the Elswick ships possess a very good form for speed, and that an aggregate of small economies in weights (in fittings, etc.), enables them to carry a large armament for their size. The Elswick cruisers may be deficient in some respects from a Naval point of view, but it can hardly be doubted that these defects could be remedied by the sacrifice of, say, a knot of speed. A good compromise exists between the Elswick and our own second-class cruisers which the unfettered genius of Sir William White is well able to discover.

Torpedo-boat destroyers.

It was estimated that fifty torpedo-boat destroyers would be completed during the year 1897–8, but delay has arisen in this as in other cases. Of the forty-two earlier destroyers of 26 to 27 knots all but five are now completed. The second batch of destroyers included forty-five 30-knot and three 32–33-knot boats. Twenty-five of the

* The trial speeds of the British ships is not given, because they are seldom tried at their load draught, and the speed is taken by log which is unreliable.

30-knot destroyers have passed through their trials. The following are some of the published results:—

Name.	Builders.	I.H.P.	Mean revolutions.	Mean speed per 3 hours.
Bat	Palmer	6189	400	30·299
Crane	"	6267	397·4	30·347
Chamois	"	—	394·2	30·22
Earnest	Laird	—	—	30·12
Fame	Thornycroft	—	—	30·168
Flying Fish	Palmer	6454	393	30.371
Foam	Thornycroft	5657	392	30·093
Griffin	Laird	—	—	30·02
Locust	"	—	—	30·15
Mallard	"	5749	397	30·201
Osprey	Fairfield	6544	394	30·6
Panther	Laird	—	—	30·16
Seal	"	—	370·5	30·02
Star *	Palmer	—	394	30·66
Sylvia	"	6000	—	29·7
Violet	Doxford	6630	381	30·16
Whiting	Palmer	6231	398	30·21
Wolf	Laird	—	370	30·11

Ships under construction. Canopus class.

Of the five battleships of the Canopus class laid down in 1896–7, the Canopus was launched at Portsmouth on October 13th, 1897, in ten months after the laying of her keel-plate. The progress of the Ocean at Devonport has been delayed by the non-delivery of castings on account of the engineer's dispute, and will not be launched till June. The Goliath will probably be launched at Chatham at the end of March. The Albion is making good progress at the Thames Ironworks, which has not been affected by the dispute, and will be launched in July. The progress of the Glory at Messrs. Laird's has been delayed. A sixth battleship of this class—the Vengeance—has been laid down at the Barrow yard, which has been bought by Messrs. Vickers. The displacement of the Canopus class is 12,950 tons; I.H.P., 13,500; and speed, 18·25 knots—as compared with displacement 14,900 tons, I.H.P. 12,000, and speed 17·5 knots in the Majestic. Some description of these vessels was given last year, but the following notes extracted from the *Army and Navy Gazette* will be of interest.

"The Canopus in many respects differs from the battleships of the Majestic type, independently of the fact that her side, barbette, and bulkhead armour are slightly thinner, although of equivalent resisting power. One important modification is in the arrangement of the forward and aft 6-in. gun casemates on the main deck. These are sponsoned out on both beams so as to bring the guns well clear of

* At initial trial starboard low-pressure cylinder broke.

the vessel's side even when they are trained axially, a position which is impossible for these guns in the Majestic and her sister ships. The end-on fire of the Canopus is much improved by this device, the striking energy in foot-tons which is represented by five minutes' consecutive fire ahead or astern being as follows :—

	Foot-tons.
Two 12-in. breech-loading wire guns, four rounds each .	264,160
Four 6-in. quick-firers, twenty-five rounds each . .	335,600
Two 12-pdr. quick-firers, seventy-five rounds each . .	63,450
	663,210

giving a total of nearly three-quarters of a million foot-tons. It will be observed that the dominant factor in computing the striking energy of this ship is the power of the 6-in. quick-firer. The weight of metal thrown in five minutes is close upon nine tons.

"Another great improvement in the Canopus is the armoured main deck. This has two 20-lb. plates worked upon it in place of the ordinary sheet steel, making a thickness of 1 in. altogether, independently of the turtleback lower deck, which varies from 3 in. to 2 in. in thickness. There is to be no wood planking upon the main deck in order to lessen the possibility of fire when the vessel is in action.

"The most singular feature of this vessel is the ram bow, which is much higher than in former battleships, being only about 7 ft. or 8 ft. below the surface of the water. The forefoot comes away at an abrupt angle from the keel, about 45 ft. from the ram point, and the whole of this portion of the bows is to be covered with 2-in. nickle-steel armour over the ordinary skin. The armoured deck is almost horizontal forward, and is worked into the cast-steel stem a very short distance above the ram point. The platform deck, very far forward, is associated with a stiffening plate of steel 2 in. thick, which is bedded into the ram. Thus the point of the latter is immensely supported by stem, armoured deck, stiffening plate, and 2-in. nickel-steel armour, as well as by the ordinary skin and framing of the ship. About thirteen of the forward frames from the ram aft are webbed with steel plating, and the spaces between are filled in with cork up to the level of the armoured deck. Thus the whole of the ram and its associated parts are a solid cellular mass, the material being at once stiff as well as elastic, the best possible arrangement of its parts being adopted. The upper-deck 6-in. gun casemates have their edges forward and aft corresponding with the centres of the main-deck casemates below. The main deck forms a natural

armoured floor to these last positions, and the upper deck has double plating to correspond. The other casemates are roofed and floored similarly."

The boilers of the Canopus will be of the Belleville type, and she will be fitted with Temperley's patent transporters for coaling purposes. The complement will be about 750 men.

First-class cruisers.

Three sister ships to the Diadem have been launched: the Niobe at Barrow on February 20th, the Europa at Clydebank in March, and the Andromeda at Pembroke in April, 1897. Of the four first-class cruisers laid down in 1896–7, the Argonaut was launched at Fairfield on January 24th, 1898, the Amphitrite is building at Barrow, the Ariadne at Clydebank, and the Spartiate at Pembroke. It is worth noting that these ships have been allotted in pairs to each yard, a practice which must result in some economy. In most respects the Argonaut and her sister ships are similar to the Diadem; the points of difference are thus referred to in the *Standard*. "The engines of the Argonaut are of the twin-screw triple-expansion type, with four cylinders—one of 34 in. diameter, one of 55½ in., and two of 64 in., the piston-stroke in each case being 48 in. The engines are to run at a higher speed than in the four vessels of the Diadem class—120 revolutions—equal to a piston speed of 960 ft. per minute, as compared with 880 ft. per minute in the Diadem class. This, it is anticipated, will give 18,000 indicated horse-power, against 16,500 indicated horse-power, increasing the speed of the ship for the same displacement from 20½ knots to 20¾ knots. In other respects the machinery in the ship is about the same as in the Diadem, there being over ninety separate engines. The results are likely to be easily realised, in view of the capacity of the boilers. Like the other ships, the Argonaut will have four funnels—this seems a necessity of the Belleville boiler."

Second-class cruisers.

The Vindictive, sister ship to the Arrogant, was floated out of dock at Chatham on December 9th, 1897; she was laid down on January 27th, 1896. The Gladiator was laid down on the same date as the Vindictive, and the Furious on June 10th, 1895. All three will be completed in 1898–9. Bearing in mind the length of time that many cruisers are building in dockyards, it is fair to infer that the rapid rate of construction of particular battleships is obtained by concentrating the energies of the yard upon these ships, and cannot be considered as normal.

Of the third-class cruisers of the Pelorus type—displacement, 2135 tons; I.H.P., 7000; speed, 20 knots—six were to have been completed during the year. The Pactolus has been launched at Elswick, the Pegasus and Pyramus at Jarrow (Palmer's), the Perseus and

Prometheus at Hull (Earle's), the Proserpine at Sheerness. The last-named will be ready for her trials shortly.

Ships laid down.

Besides the Vengeance three battleships were to have been laid down during the year. The Formidable was laid down in March at Portsmouth. The Irresistible will be laid down at Chatham possibly before the end of the year. The Implacable cannot be laid down till the launch of the Ocean in June. We regret to record that the dimensions of these new battleships are as follows: displacement, 15,000 tons; length, 400 feet; beam, 75 feet; mean draught, 26 feet 9 inches. With natural draught, the horse-power is to be 15,000, and the speed 18 knots. The armament comprises four 12-in. B.-L. and twelve 6-in. Q.-F. guns of a new pattern, besides thirty small quick-firing guns. The coal capacity at load draught is 900 tons.

The plea for moderate dimensions has often been urged in these pages, and the weighty remarks of Professor Laughton on this subject in his review of the Naval Progress of the Year,* are well worth quoting here. "Numbers only can annihilate, numbers only can ensure our being present at the scene of action with an adequate force. Assuredly our responsibilities have not grown less during the past century; whence it follows that our need for numerical preponderance is greater now than ever. And seeing the vastness of our ships and their enormous cost, there can be little doubt that we are throwing needless difficulties in the way of attainment to that superiority. With ships of the third rate, Hawke and Jervis, Nelson and Collingwood maintained long and strict blockades, thanks to their careful arrangement of victuallers and reliefs; for never were the vessels of the old Navy in any way independent of home. Well, then, may it be asked, in virtue of what new teaching has it become imperative to sacrifice our numerical superiority for the visionary advantage of making each ship independent? Visionary, indeed; for in a two years' blockade the capital ship of 15,000 tons is bound to prove only less dependent on the shore than her prototype of 2000 tons or less."

The teaching of history is beyond question that numbers have greater effect than individual size and power in an action, and are absolutely vital to the result of a Naval war. There are three special reasons why the arguments in favour of moderate dimensions should be pressed with force at the present time.

1. For some time past our shipbuilding efforts have been concentrated on battleships of the larger size, and in consequence we have a great preponderance over our possible enemies in ships of this class. On the other hand, we are distinctly weak in ships of moderate size

* In the Naval Diary and Handbook, 1898.

and draught, and yet of sufficient speed and fighting qualities to deal with the Sissoi Veliky, the Bouvines, and the Henri IV. It is a great waste of power to have to utilise a Majestic to neutralise a ship like the Sissoi Veliky. Moreover, in shallow waters, she would be incapable of doing so.

2. There has been of late years a considerable shifting of Naval strength from southern to northern Europe. The French Northern Squadron four years ago was a negligible quantity, to-day it is an efficient force. The Germans have decided to strengthen their Navy, and war with Germany is far more probable now than it was three years ago. The Russian Baltic is increasing in importance. The strength of the various Navies is reviewed in detail in a later chapter; but it is certain that there is much greater probability of our needing ships for operations in the waters of northern Europe, whether in the Sound or the Channel, than there was a few years ago.

3. It is evident from the immense sums of money that are being spent on the defences of numerous Channel ports that the Naval authorities at the Admiralty attach great importance to our possessing numerous Naval bases in which our fleets can lie securely during war time. An increase in the amount of expenditure already sanctioned under the Naval Works Bill on Dover Harbour was recommended to the House of Commons by the Civil Lord of the Admiralty on the ground, amongst others, that it would enable a fleet of 18 battleships to lie securely at anchor in the harbour. The soundness of this idea cannot be discussed at length here; but there are, no doubt, many authorities on Naval strategy who would say that if we did have a fleet of 18 battleships available for the defence of home waters in war time, the last place where they ought all to be in at one time is Dover Harbour. But, admitting that the policy is sound, and that we are to maintain a fleet in war time for operations close at hand, whose base is to be Dover Harbour, it is clear that we need not build Majestics or Implacables for this purpose. Ships with considerably less sea-keeping qualities would be fit for such a *rôle*, though without doubt it is a sound principle of battleship construction that no ship should be built for the British Navy which is not fit "to lie in a line" against the most powerful battleships building elsewhere.

Armoured cruisers.

The four armoured cruisers Aboukir, Cressy, Hogue, and Sutlej were to have been laid down this year. Their dimensions are as follows: Displacement, 12,000 tons; length, 440 ft.; beam, 69 ft. 6 in.; draught, 26 ft. 3 in. Speed, 21 knots, with 21,000 I.H.P. under natural draught. Armament, two 9·2-in. breach-loading, twelve 6-in.,

and seventeen smaller quick-firing guns. The commencement of these cruisers has been delayed by the introduction of new types of guns. The contracts will be placed by the end of the year.

Second class cruisers.

Three new second-class cruisers of 5600 tons have been laid down, the Hyacinth at the London and Glasgow yard, the Hermes and Highflyer at Fairfield. Eleven 6-in. quick-firing guns have been substituted for the five 6-in. and six 4·7-in. guns of the Eclipse The speed with natural draught is 20 knots as compared with 19 knots. The armament is satisfactory.

Third-class cruisers.

Three third-class cruisers of the Pelorus type have been laid down, the Psyche at Devonport in November, the Pioneer at Chatham in December, 1897, and the Pandora at Portsmouth in January, 1898.

Two sloops and four gunboats have, we regret to say, been laid down.

Refits.

The battleship Rodney has had her 6-in. breach-loading replaced by quick-firing guns. The Royal Arthur, Hotspur, five second-class cruisers, and seven third-class cruisers, besides other vessels, have been refitted. In this connection we would strongly urge that the Dreadnought, Sultan, Hercules, and Temeraire at any rate should be rearmed with modern guns. The French are modernising the armament, etc., of nearly all their battleships of the second line at a cost of upwards of £800,000.

Naval works.

The delay in the progress of the works at Gibraltar, Hong Kong, and other localities, seems to point to the fact that the Works Department of the Admiralty is not strong enough to deal with the enormous additional responsibility that has been recently thrown upon it.

Jubilee Review.

The Fleet assembled at Spithead for the Jubilee Review was, it goes without saying, the most powerful that has ever been brought together. The fact that this great fleet of warships—mostly of modern types—was assembled without withdrawing ships from foreign stations might well fill a Briton's heart with pride and confidence in the Naval strength of his country. The Fleet reviewed by Her Majesty at the close of the Russian War in 1856 was more numerous. It consisted of upwards of 250 vessels, but of these 140 were gunboats and 50 mortar-boats. The Jubilee Fleet numbered 165 pennants, including non-effective ships, such as the training-brigs. To give a description of each ship would be to repeat what has already appeared in these pages. It will, however, be of interest to follow the example of the *Naval and Military Record*, and to give a list of the Fleets of 1887 and 1897 side by side, to show the progress of the last ten years.

Browndown Camp
Browndown Pt
Rifle Ranges
Shingle
Gilkicker Fort
Stokes B
Fort Monckton
Portsmouth
Southsea
Southsea Common
Royal Yacht
Osborne Bay
Peel Bank
Kings Quay Creek
Wooton Pt
Ryde
Station
Storm Signal Sta
Railway Pier
Sturbridge Shoal
W Sturbridge
E Sturbridge
Noman's Fort
Magnetic

YACHTS AND OTHER VESSELS
SMALL VESSELS
SMALL GOVERNMENT VESSELS
YACHTS & SMALL VESSELS
LARGE MERCHANT VESSELS
SMALL VESSELS ON SPECIAL LIST

A Foreign Men of War
B Battle Ships & Cruisers
C Battle Ships & Cruisers
D 3rd Class Cruisers, Gun Vessels & Torpedo Gunboats
E Special Merchant Vessels
F Destroyers & Gunboats
G Torpedo Boats

Maha Chakra
Fuji
Frithiof
Gotha
Heligoland
Vasco di Gama
Evertsen
Pothuau
Rossia
Brooklyn
Lepanto
Viscaya
Konig Wilhelm
Wien

SYMBOLS EMPLOYED
Battleship 1st Class
" 2nd "
" 3rd "
Armoured Cruiser
Cruiser 1st Class
" 2nd "
" 3rd " & Dsyr
Torpedo Gunboat
Destroyer or Torpedo Boat
Old Gunboats & craft of little fighting value
Commander-in-Chief
Flagship
M L Ship armed with Muzzle-loaders

Cables 10 5 0 1 2 Sea Miles

CHART OF THE SPITHEAD REVIEW.

Two Jubilee Fleets.

Battleships.

First Class.

1887.		1897.	
Collingwood	1	Collingwood, Howe, Benbow	3
		Sans Pareil	1
		Royal Sovereign, Resolution, Repulse, Empress of India	4
		Renown	1
		Magnificent, Majestic, Prince George, Victorious, Mars, Jupiter	6
Total	1	Total	15

Second Class.

1887.		1897.	
(a) Devastation	1	Devastation, Thunderer	2
(a) Neptune	1	Alexandra	1
(a) Ajax	1	Inflexible	1
(a) Inflexible	1	Edinburgh, Colossus	2
(a) Edinburgh	1		
Total	5	Total	6

Third Class.

1887.		1897.	
(b) Hercules	1	Nil.	
(b) Monarch	1		
(b) Invincible, Iron Duke	2		
(b) Sultan	1		
(b) Conqueror	1		
Total	6		
Total battleships	12	Total battleships	21

Coast-Defence Ships.

1887.		1897.
Prince Albert	1	Nil.
Glatton	1	
Cyclops, Hecate, Gorgon, Hydra	4	
(b) Hotspur	1	
(b) Rupert	1	
(b) Belleisle	1	
Total coast-defence ships	9	

Cruisers.

First Class.

1887.		1897.	
Black Prince, Minotaur, Agincourt	3	Black Prince, Minotaur, Agincourt	3
Shannon	1	Northampton	1
Imperieuse	1	Warspite	1
		Australia, Galatea, Aurora	3
		Blake, Blenheim	2
		Royal Arthur, Endymion, Edgar, Theseus	4
		Powerful, Terrible	2
Total	5	Total	16

(a) In 1887 ranked as first-class battleships.
(b) In 1887 ranked as second-class battleships.

Second Class.

1887.		1897.	
ACTIVE, VOLAGE, Rover	3	ACTIVE, VOLAGE	2
Arethusa, Amphion	2	Phaeton, Leander	2
MERSEY	1	MERSEY	1
Mercury	1	Apollo, Latona, Naiad, Spartan, Æolus, Melampus, Andromache, Thetis, Tribune, Terpsichore, Brilliant, Sappho, Sirius	13
Inconstant	1	Hermione, Charybdis, Flora, Bonaventure	4
		Minerva, Venus, Diana, Dido, Isis, Juno, Doris	7
Total	8	Total	29

Third Class.

1887.		1897.	
CALYPSO	1	CALYPSO, Calliope, Champion, Curaçoa	4
Fearless	1	Medea, Medusa, Magicienne	3
Archer, Mohawk	2	Barracouta	1
		Pelorus	1
Total	4	Total	9
Total cruisers	17	Total cruisers	54

TORPEDO-GUNBOATS.

1887.		1897.	
RATTLESNAKE	1	RATTLESNAKE, Spider	2
		Sharpshooter, Skipjack, Spanker, Sheldrake, Gleaner, Gossamer	6
		Alarm, Antelope, Jason, Circe, Renard, Leda, Onyx, Niger, Jaseur, Speedy	10
		Halcyon, Hazard	2
Total	1	Total	20

Destroyers.

1887.		1897.	
Nil.		27-knot boats	22
		30-knot boats	8
	0	Total	30

Torpedo-Boats.

1887.	1897.
38	20

SLOOPS AND GUNBOATS.

1887.		1897.	
"Staunch" class (third-class gunboats)	22	Albacore, Raven, Cockchafer, Starling (second-class gunboats)	4
"Medway" class (third-class gunboats)	8	Racer (sloop)	1
Bramble (first-class gunboat)	1	CURLEW, Landrail (gun-vessels)	2
CURLEW (gun-vessel)	1		
Total sloops and gunboats	32	Total sloops and gunboats	7

NOTE.—Ships in small capitals were present at both reviews.

SUMMARY.

BATTLESHIPS.

Class	1887	1897
First class	1	15
Second class	5	6
Third class	6	—
Total	12	21
Coast-defence ships	9	—
CRUISERS.		
First class	5	16
Second class	8	29
Third class	4	9
Total	17	54
TORPEDO CRAFT.		
Torpedo gunboats	1	20
Torpedo-boat destroyers . . .	—	30
Torpedo-boats	38	20
Total	39	70
Sloops and gunboats	32	7
Total	109	152
Add training brigs, &c. . . .		13
		165

The Fleet was reviewed by the Prince of Wales, as representing Her Majesty, on June 26th. The Royal procession passed to and fro between the lines in the following order:—"The Trinity yacht Irene led the line, piloting the Victoria and Albert with the Prince of Wales on board, surrounded by a brilliant staff and a large assemblage of the more august of the Royal guests. The remainder of the Royal guests followed in the P. & O. liner the Carthage, which was substituted for the Osborne in order to afford more spacious accommodation to her distinguished passengers. Then followed another Royal yacht, the Alberta, and the Enchantress came next with the Lords of the Admiralty and their friends. Next came the Danube, freighted with members of the House of Lords, and next the Wildfire, with the Colonial Premiers, who were accompanied by the Secretary of State for the Colonies. Next followed the House of Commons in the Campania, whose immense bulk dwarfed every ship in the fleet, even the Powerful and the Terrible, the longest ships in the Navy, while her splendid appearance attracted universal admiration. Lastly came the Eldorado with the foreign Ambassadors. In this order the pro-

cession again reached the head of the line, and here the majority of the ships left it for their respective stations, but the Victoria and Albert, preceded by the Irene and followed by the Alberta, turned again so as to pass between the lines A and B, and came to an anchor in the space provided for her in line A, abreast of the Renown, the temporary flagship of the Commander-in-Chief. Here all the flag-officers present were received by his Royal Highness, and when this ceremony was concluded the Royal yacht weighed anchor and returned to Portsmouth, receiving as she left the lines three simultaneous cheers from every ship in the fleet. As the echo of these hearty cheers rolled along the lines in "a tumult of acclaim," everyone who heard it must have felt that no throne was ever more securely guarded by the loyalty and might of a world-wide Empire, and no Sovereign ever more sincerely loved and revered by subjects of every class and every clime."—*Times*.

Jubilee Review and Kiel.

It was unfortunately rather hazy on June 26th, but less so than on the preceding days. Even had it been clear, the eye could hardly have taken in those long lines of ships stretching away up the Solent for five miles or more. The ships in line B alone constituted a fleet which could have knocked to pieces the combined fleets assembled at Kiel, including the German, but excluding our own. As a spectacle, the Kiel gathering was perhaps to be preferred. The harbour is more confined than the Solent, barely two miles across at the widest point, and there was the contrast between the squadrons representing the different powers—a variety which was lacking at Spithead. Nothing could have been more beautiful than the effect of the fleet illuminated on the night of June 26th.

Some of the reflections of the able correspondent of the *Times* may well be quoted here:—

"Military pageants have an inevitable element of unreality. Theatrical they must be, since it is not possible to present even an army corps fully equipped for war. Everything that is essential to military operations was necessarily omitted from the gallant show of last Tuesday, and even at the Aldershot review the troops must be seen apart from the less showy but vital adjuncts which constitute them a fighting body. Here at Spithead the difference is organic. Each ship is a unit complete in itself, and ready if required to go into action to-morrow. In eight hours this magnificent fleet could proceed to sea. In four days the Channel, Reserve, Special and gunboat squadrons, with the destroyer flotilla—in all 120 ships—could be at Gibraltar. In nine days the Channel Squadron of 29 pendants could be at Halifax; in 27 days at Table Bay; in 58 days at Hong Kong. Herein lies the essential difference between naval and military forces,

between the Naval Review and a military display. The one represents power instantly available; the other is an exhibition of what may or may not possess the qualifications of an effective fighting body. The very essence of sea-power lies in the complete mobility of the units. It is force perfectly decentralised, yet perfectly controlled, and elastic to the last degree. It can be transferred at will to far distant spheres of action, suffering no deterioration in the process. 'Naval strategy,' states a recent military writer, 'has peculiar difficulties. The obstacles in the way of concentration are far greater than on shore.' It would be almost impossible to propound a more hopeless fallacy. At best an army is an unwieldy force, which, once directed on any line, can with difficulty be withdrawn or deflected, which to exist must drag after it huge trains whose management determines its strategy, and which can regroup or subdivide itself only within rigid limitations. 'A squadron of battleships,' writes the same authority, 'is not so easily manœuvred as a division of infantry.' The suggestion that these are equivalent and comparable forces is sufficiently naive; but the squadron can be handled with perfect ease by day or night, while the evolutions of the division, unless acting as a parade body, require time, light, and favourable ground. A few signals from the Renown would suffice to detach and send to sea any assigned vessels of this great fleet, and the ships so detached would at once become an effective fighting squadron, provided with a commander and ready for any emergency.

"Not the number of ships alone, but the special attributes of sea-power confer significance upon this unexampled scene. To the British nation the Navy implies security, progress, and freedom. The fleet which the Prince of Wales has reviewed to-day is the gauge of our maritime strength and the true symbol of Imperial unity. In it our Colonial visitors will see the evidence of the determination to hold the sea which unites their interests with ours, and from the free gifts of which they and we have derived our prosperity in the past and must draw our hopes of the future.

"It is well to remember, however, that the great movement of which this fleet is the practical result has been the work of quite recent years, and that it has been attained by the appeal to history and to the intelligence of the British people. The period of extreme peril from which we have at length emerged must never be forgotten. We dare not relax effort; come what may, the command of the sea must be held. 'The Royal Navy of England,' wrote Blackstone more than one hundred years ago, 'hath ever been its greatest defence and ornament; it is its ancient and natural strength.' These words have now a meaning which the writer could not have wholly foreseen.

"One other reflection is suggested by this magnificent Naval spectacle. Such an assemblage of warships under the flag of any other Power would have implied a direct menace. Our least friendly foreign critic can, however, find nothing to arouse his susceptibilities in the reassertion of a time-honoured national policy. A powerful British Navy is the best guarantee of the peace of the world."

The *New York Tribune* accepts as entirely true an English remark that the Americans are almost as pleased and proud as though the Diamond Jubilee were their own. It declares that American affection towards Great Britain, "for natural and obvious reasons," is stronger than that of Great Britain towards America, and concludes an eloquent article thus:—

"He would be a narrow-minded Briton who, seeing the greatness of America, did not feel a thrill of pride in saying, 'That is the nation which we Britons planted.' Equally narrow and ungracious would be the American who, surveying the splendours of the Victorian realm, should feel no answering thrill of pride in saying, 'That is the Empire, that the stock from which we Yankees sprang.' So far as this Jubilee commemorates the personal achievements of the Queen and the individual attainments of the British Empire, Americans regard it with the pleasurable sympathy due to a friendly Sovereign and a friendly Power. So far as it sets forth the might and majesty and foreshows the auspicious and resplendent destiny of the common race, they rejoice and exult in it as though it were, as indeed in that commanding sense it is, their own."

CHAPTER II.

The Progress of Foreign Navies.

The most important Naval event of the last twelve months was the great Review at Spithead, which on the one hand gave the whole world a very clear idea of the maritime power of Great Britain, and was, on the other, an admirable object-lesson of the progress of construction achieved, not only in the Navy, but in the mercantile marine and in the yachting world. The Fleet gathered for the Review far surpassed any recent exhibition of Naval power. There is nothing remarkable to record in the history of foreign Navies during the year. At one time it was thought that the war between Turkey and Greece would give rise to some incident of Naval interest, but neither of the belligerents made any real attempt to utilise its Navy, and the struggle was concluded without the ships having taken part. The despatch of a German Squadron to the China Sea, and the occupation of the Bay at Kiao-Chao without a blow, hardly deserve to be mentioned from our point of view. Certain Navies have carried out operations devoid of technical interest—operations which were simple and easy because of the weakness of their adversaries. Every Naval power is increasing its fleet, and consequently its expenditure for Naval purposes, as will appear later when we review each in detail. From a technical point of view, there would have been no important step forward to chronicle if the Turbinia had not made her brilliant appearance. To those who believed that we should be content for some time with the speed of 30 knots of the torpedo-boat destroyers, she has shown that the human mind is never satisfied with results already attained. The Turbinia is perhaps destined to revolutionise Naval construction by a very desirable simplification in one of its principal branches. The progress achieved in the last few years, which in almost every branch of Naval art has been due rather to improvements in details than to new inventions, is thrown into the shade by her appearance. Both gun and armour are constantly being improved, continuing the struggle which began with the first armoured ship. For the moment it appears as if capped shot and shot of special manufacture have the advantage over the best armour; but it must always be borne in mind that the conditions of the proving ground are not those which will be found in actual war. The use of water tube

boilers is becoming more and more general, which is not astonishing considering the advantages which they possess for warships. We now turn to Foreign Navies, which we review in the same order as in previous years.

FRANCE.

At the moment of writing, the Estimates of 1898 have not been voted,* but as the Budget Committee and the Minister of Marine are at one, it is unlikely that the principal votes will differ much from those adopted by the Committee. It is, however, possible that some of the votes affecting the *personnel* will be altered—increased rather than reduced—because every member of the Chamber has unlimited power to ask, by means of an amendment, for increases or reductions of expenditure. Whether this takes place or not, we may calculate on the estimates amounting to approximately the sum approved by the Committee, viz., £11,421,377. The Navy Estimates for 1897 amounted to £10,610,920, including £284,230 voted on 7th August, for various additional ships to be laid down. The increase from one year to the other, which amounts to £800,000 in round numbers, together with the surplus arising from different heads of the Budget, is devoted to new construction. This increase of expenditure is necessitated by the adoption of a shipbuilding programme which will entail, according to the present estimate, an expenditure of £32,229,456. The last ships of this programme are to be delivered in the course of 1905. The total expenditure is divided as follows :—

Completion of ships building on 1st January, 1897 . .	£7,522,494
Ships to be commenced on the same date	£24,706,962
Sums voted for 1897	£3,356,833

The credits to be opened from 1st January, 1898, to 31st December, 1905, amount to £28,872,623, and the sums to be spent on new construction are :—

In 1898	£4,087,452
1899	£4,459,797
1900	£4,519,663
1901	£4,784,681
1902	£4,597,955
1903	£3,615,323
1904	£2,120,597
1905	£564,222

For the year 1898 the sum to be devoted to new construction amounts to £4,087,452, as compared with £3,191,849 for the year

* The Navy Estimates have been voted by the Chamber of Deputies with considerable increases on most heads, and as these create a deficit the Senate is unlikely to sanction them.—ED.

1897, but it should be remarked that the shipbuilding vote in 1897 was considerably lower than that of the five preceding years. In order to press forward the refit of a certain number of battleships now on service, the sum of £815,272 will be spread over the next three years, the work to be completed in the course of the year 1900, viz., £290,178 in 1898, £312,106 in 1899, and £212,987 in 1900. In the Budget of 1898 various expenditures are proposed on Naval bases, but most of the money will be devoted to Bizerta, where in a few years the French Navy will have created a second-class but well-fortified arsenal, in which her ships can take shelter and refit in security.

The distribution of Naval forces is undergoing some change. The Reserve Squadron of the Mediterranean has been abolished, and has become a simple division placed under the orders of the Vice-Admiral in command of the Active Squadron. On the other hand, the Channel Squadron, composed of two divisions, will have full complements for eight months, instead of six months, as in 1897.

Ships launched.

Turning to ships launched. The first-class cruiser Guichen was launched on the 26th October, 1897. She is a commerce-destroyer, laid down when M. Félix Faure was Minister of Marine, and the design owes its origin to the American Columbia. Another ship of this type, the Chateaurenault, of which a detailed description was given in the *Naval Annual* for 1896, is to be launched shortly. The new programme does not provide any ship of this class, and the criticisms which have been passed on the Columbia apply with equal force to the Guichen and Chateaurenault. A comparison of the principal characteristics of the Guichen and Columbia will be of interest:—

	Guichen.	Columbia.
Length	436 ft.	412 ft.
Beam	54 ft. 10 in.	58 ft. 2 in.
Draught of water aft	24 ft. 7 in.	22 ft. 6 in.
Displacement	8277 tons	7467 tons
I.H.P.	24,000	18,500
Maximum speed with forced draught	23 knots	22·8 knots
Speed with natural draught	20 knots	—
Bunker capacity	1460 tons	1670 tons
Radius of action at 12 knots	7600	—
Armament	2 6·4-in Q.-F. 6 5·5-in. Q.-F. 10 1·8-in. Q.-F.	1 8-in., 2 6-in. Q.-F.; 8 4-in. Q.-F.; 12 6-prs.; 4 1-prs.

The American commerce-destroyer has a more numerous armament, but it is not so well protected. She is not quite so fast, the estimated speed, which was considerably exceeded on trial, being

21 knots. If the Guichen comes up to the expectations of the design, she will be somewhat superior to the Columbia. The Guichen is only protected by a turtle-back armoured deck, which extends the whole length of the ship, and rises amidships to 4 ft. 6 in. above the water-line. Its maximum thickness is 2½ in., diminished at the extremities and on the horizontal portion. There is a cofferdam forming a complete belt, and filled with zinc boxes kept in place by a light framework. The conning-tower is protected by 6·3-in. Harveyed steel armour, and communicates with the armoured deck by an armoured tube enclosing all the means of transmitting orders. In general appearance the Guichen will resemble a mail steamer; she will have two masts and four funnels. The 6·4-in. Q.-F. guns are mounted on pedestal mountings forward and aft, and are protected by 2-in. chromo-manganese steel. The 5·5-in. Q.-F. guns are on the broadside on the upper deck, and protected by 2-in. shields and by 1·6-in. casemates. The forward and after guns fire through angle ports, the two others are on sponsons. The armament is so distributed that the Guichen can deliver an end-on fire from one 6·4-in. and four 5·5-in. guns, and on the broadside from three 5·5-in. and two 6·4-in. guns. There will probably be ten 1·8-in. guns but the number is not finally settled. There are three four-cylinder triple-expansion engines each driving a three-bladed propeller, and intended to develop 7890 horse-power. Steam will be supplied by thirty-six Lagrafel and d'Allest water-tube boilers. The ship will be lighted by electricity, and will carry six search-lights.

D'Estrées. The D'Estrées, which was launched at the same time as the Guichen, is a third-class station cruiser, sheathed with wood and coppered. Her principal dimensions are: Length, 311 ft. 8 in.; beam, 39 ft. 4 in.; draught of water aft, 17 ft. 8 in.; displacement, 2452 tons. There are two propellers and two vertical triple-expansion engines, developing 8500 horse-power, to which steam is supplied by Normand boilers. The estimated speed is 20·5 knots. The coal supply is 345 tons, which gives an endurance of 5750 miles at 10 knots, and 930 miles at full speed. The coal endurance will be increased in practice by shipping 125 tons of coal beyond the quantity carried at load draught. The armament comprises two 5·5-in. guns, one forward and the other aft; four 3·9-in. guns on sponsons on the broadside; eight 1·8-in. and two 1·4-in. guns, all Q.-F. There will be no torpedo-tubes.

Lavoisier. The Lavoisier is also a third-class cruiser, but is classed with the fleet-cruisers, and has no sheathing. Length, 330 ft. 2 in.; beam, 34 ft. 6 in.; draught of water aft, 17 ft. 10 in.; displacement, 2317

tons. Two vertical triple-expansion engines, to which steam is supplied by Belleville boilers, are to give a speed of 20 knots. The coal endurance at 10 knots is 3000 miles, and at full speed 600 miles. The armament comprises four 5·5-in., two 3·9-in., eight 1·8-in., and two 1·4-in. Q.-F. guns, four machine-guns, and two above-water torpedo-tubes.

Kersaint.

The Kersaint, which has also been launched, is a first-class gunboat, sheathed with wood and coppered. Length, 226 ft.; beam, 34 ft. 5 in.; draught of water aft, 15 ft.; displacement, 1243 tons. She has only one engine, of the vertical triple-expansion type, and D'Allest boilers. The maximum speed is 15 knots, with 2200 horse-power. The armament comprises one 5·5-in. Q.-F. gun forward, five 3·9-in. Q.-F. guns, of which one is mounted aft and the others on the broadside, and seven 1·4-in. Q.-F. guns. The Kersaint is without interest from a military point of view.

Dunois.

The torpedo-gunboat Dunois has been launched at Cherbourg, where a similar vessel, the La Hire, is on the stocks. Length, 256 ft.; beam, 27 ft. 10 in.; draught of water aft, 12 ft. 8 in.; displacement, 896 tons. Two triple-expansion engines, each driving one propeller, are to give a speed of 23 knots with 6400 horse-power. The boilers are of the Normand type. The armament consists of six 2·5-in. Q.-F. guns mounted on the spar deck, and six 1·8-in. Q.-F. guns which are mounted two on the bridge, two on the spar deck, and two on the poop. There are no torpedo-tubes. The Dunois and La Hire appear to be the last specimens of this kind of torpedo vessel in the French Navy. The Hallebarde type, which is smaller, and calculated to steam 25 knots, is preferred.

Programme of 1897–8.

Various modifications have been made during the year 1897 in the shipbuilding programme. We announced last year that the battleship A 3 would be an enlarged Henri IV. This vessel, which has been named the Iéna, has now become an enlarged Charlemagne, and will be of 12,052 tons displacement. On the other hand, the armoured cruiser C 3, now named the Dupetit-Thouars, which was to be of the Jeanne D'Arc type (11,270 tons), is to be of 9517 tons displacement. The ships laid down in the last months of 1897, and to be laid down in the course of the present year, are as follows: two battleships, nine armoured cruisers, six destroyers, five sea-going torpedo-boats, six torpedo-boats. The contracts and the orders for commencing the majority of these ships have been signed. The dockyards are in full work. The number of ships completing, going through their trials, and on the stocks makes a grand total of eighty-four ships, viz.:—Nine battleships, eleven armoured cruisers, three first-class cruisers, three second-class cruisers, two third-class

cruisers, one first-class gunboat, ten destroyers, six sea-going torpedo-boats, thirty-six first-class torpedo-boats, one gunboat, one transport, one submarine boat. Of these, one battleship, five armoured cruisers, two first-class, two second-class, and one third-class cruisers, eight destroyers, and six sea-going, and thirty-two first-class torpedo-boats, will be built by contract. The twenty-seven other vessels will be built in the dockyards.

Iéna. The battleship Iéna has been laid down at Brest. Length, 400 ft. 9 in.; beam, 68 ft. 2 in.; draught of water aft, 27 ft. 6 in.; displacement, 12,052. Like all the new French battleships she has three propellers. Steam will be supplied to her three vertical triple-expansion engines by twenty Belleville boilers fitted with economisers. The furnaces are arranged so that petroleum can be used mixed with coal. With 15,500 horse-power the speed is to be 18 knots. The normal coal supply is 820 tons, giving an endurance of 5500 miles at 10 knots, and 1100 at full speed. The ship can carry 280 extra tons of coal, which will extend the endurance to 7000 and 1500 miles respectively.

The armament comprises four 12-in. guns mounted in pairs in turrets forward and aft, sixteen 1·8-in. and five 1·4-in. Q.-F. guns, and thirteen 1·4-in. revolver guns. It is in the secondary armament that the Iéna differs from the Charlemagne, Gaulois, and St. Louis. The Charlemagne type carries ten 5·5-in. and eight 3·9-in. guns, while the Iéna has eight 6·4-in. and eight 3·9-in. Q.-F. guns. The 6·3-in. guns will be carried in armoured casemates like the eight 5·5-in. guns in the main deck battery of the Charlemagne; four firing ahead and the same number astern. Four of the 3·9-in. guns will be carried above the centre casemates, the four others before and abaft of the bridge protected by shields in each case. There are four torpedo-tubes, of which two are submerged, while the two above-water tubes are forward and protected by thin armour. The complement of the Iéna is 31 officers and 600 men. She will cost £1,136,385, and will be completed in 1901.

A 9. The battleship A 9 will also be built at Brest, and will probably be a repetition of the Iéna. Her designs will be prepared during the current year. She is to be completed in 1902.

Armoured cruisers. The new armoured cruisers are of two types. The first six, the Dupetit-Thouars, Gueydon, Montcalm, C 4, C 7, and C 8, will be of 9517 tons displacement; the three others, the Desaix, Kléber, and Dupleix, will be of 7700 tons displacement. The Dupetit-Thouars, the first of these large cruisers, has been laid down at Toulon. Length, 452 ft. 9 in.; beam at the water-line, 63 ft. 8 in.; mean draught, 23 ft.; draught of water aft, 24 ft. 7 in.; displacement,

9517 tons; speed with modified forced draught, 21 knots. Three vertical triple-expansion engines, developing a total of 19,600 horse-power, will drive three propellers. Steam will be supplied by twenty Normand water-tube boilers. Provision will be made for using petroleum mixed with coal in the furnaces. The hull will be protected by a 6-in. water-line belt, and above the belt by thin armour of a maximum thickness of 3·8 in., and of a minimum thickness of ·6 in., covering the ship's side between decks. An armoured deck and a thinner splinter-deck complete the protection of the vitals of the ship. The supply of fuel (including both coal and petroleum) is 1020 tons, which gives an endurance of 6500 miles at 10 knots. This supply can be increased to 1600 tons, which will give an endurance at 10 knots of 10,000 miles. Armament: two 7·6-in. guns mounted in turrets, one forward and one aft on the centre line of the ship; eight 6·4-in. Q.-F. guns in armoured casemates on the broadside, firing four ahead and four astern; four 3·9-in. Q.-F. guns on the superstructure, firing two ahead and two astern. This arrangement gives an end-on fire from seven guns either ahead or astern. The light armament consists of sixteen 1·8 and six 1·4-in. Q.-F. guns. There will be two submerged torpedo-tubes and six search-lights. The crew will consist of 580 men and 32 officers.

The Gueydon, sister ship to the Dupetit-Thouars, is under construction at Lorient. She will be fitted with twenty-eight Niclausse boilers, distributed in four boiler-rooms, of which two will be forward of the engine-room, containing eight and six boilers respectively. The boilers will be distributed in the same way in the boiler-rooms abaft the engine-rooms. The maximum power provided in the contract with forced draught will be 20,200 horse-power, with a consumption not exceeding 36 lbs. of coal per square foot of grate. The armoured cruiser C 4 will be built at Cherbourg, C 7 at Lorient. The other two have been ordered by contract. Gueydon

Of the three armoured cruisers of 7,700 tons, the Desaix and Kléber are to be built in private yards; the Dupleix in the dockyard at Rochefort. The principal dimensions are:—Length, 426 ft. 6 in.; beam, 58 ft. 4 in.; draught of water aft, 24 ft. 4 in. They have triple screws, vertical triple-expansion engines, and water-tube boilers. The Kléber will have twenty Niclausse boilers in four groups. The estimated speed is 21 knots, with 17,100 horse-power. The coal supply at load draught is 880 tons, but an extra supply of 320 tons can be carried; the endurance at 10 knots being respectively 6450 and 8800 miles. The furnaces will be fitted for using petroleum mixed with coal. The armament comprises ten 6·4-in., ten 1·8-in., and six 1·4-in. Q.-F. guns, and two above water Desaix. Kléber. Dupleix.

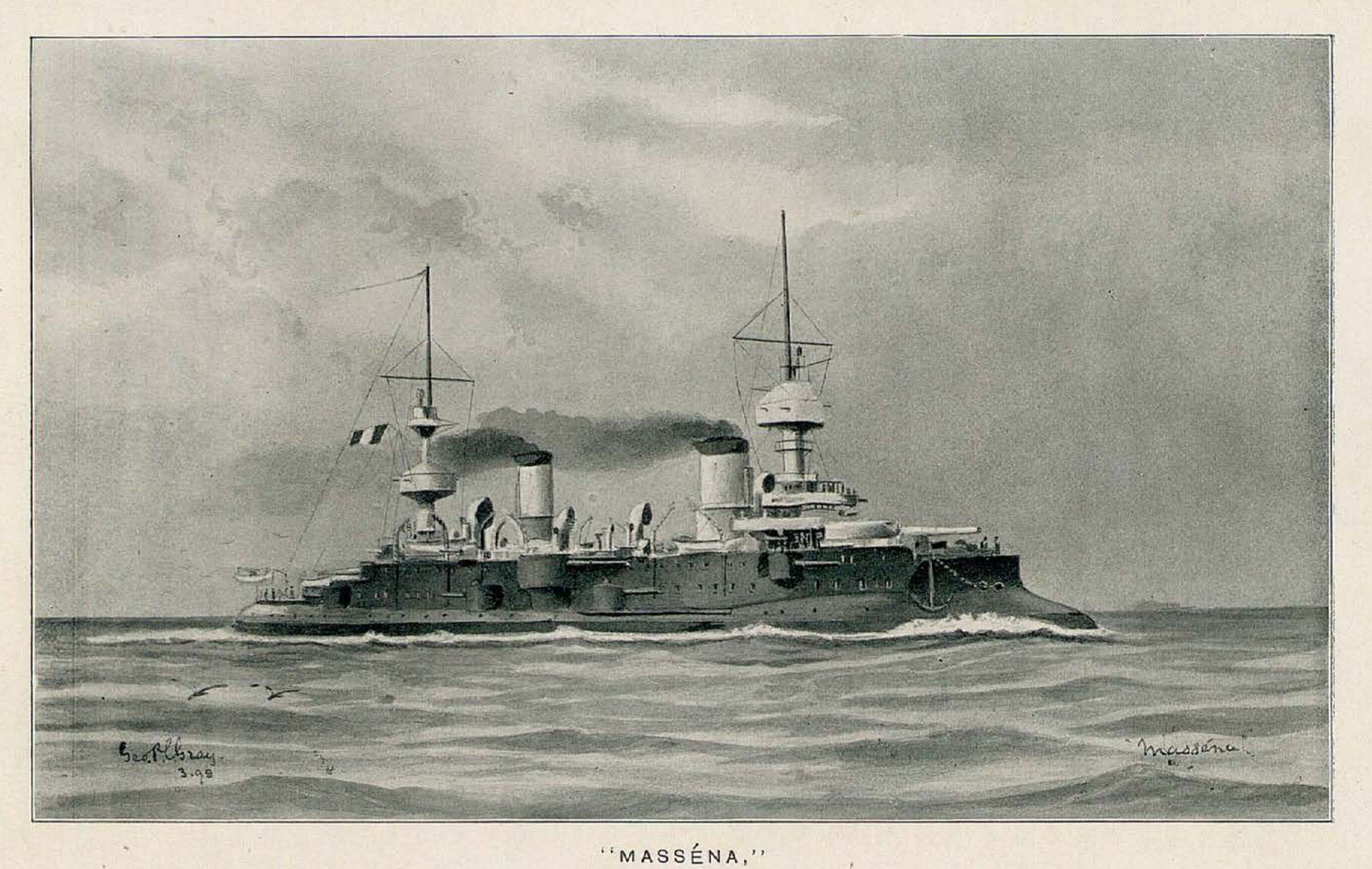
torpedo-tubes. These cruisers, being intended for foreign stations, will be sheathed with wood and coppered. The Dupleix replaces a protected cruiser of 5000 tons, which was struck out of the programme before the Budget was voted.

It is open to question whether it is wise to include two new types of armoured cruisers in the programme. There are so many advantages in building ships in classes that the question of adopting only one type of armoured cruiser has been under the consideration of the "Conseil Superieur de la Marine," who have decided that in future ships of this type are to be constructed in groups from the same designs.

Destroyers. Although they have the same armament and the same speed, the six torpedo-boat destroyers belong to two types; the Fauconneau and Espingole are of less displacement than the four others. Their principal dimensions are as follows:—Length, 183 ft. 9 in.; beam, 19 ft. 6 in.; draught of water aft, 10 ft. 6 in. They will have two screws driven by independent vertical engines, to which steam is supplied by Normand boilers. I.H.P. 4800; speed, 26 knots. The coal-supply is 37 tons, which gives an endurance of 2300 miles at 10 knots. The armament consists of one 2·6-in. and six 1·8-in. Q.-F. guns and two torpedo-launching carriages. The four other destroyers are named the Pique, Epée, Framée, and Yatagan. The principal dimensions are:—Length, 185 ft. 9 in.; beam, 19 ft. 6 in.; draught of water aft, 9 ft. 10 in.; displacement, 319 tons; horsepower, 5700. The armament is the same as that of the Fauconneau type, but it should be noted that the coal-supply is only 33 tons instead of 37.

Torpedo-boats. The designs of the five sea-going torpedo-boats, which will be of about 150 tons displacement, are in course of preparation. Six torpedo-boats will be added to the already lengthy list of those under construction. Length, 121 ft. 4 in.; beam, 13 ft. 2 in.; draught of water aft, 8 ft. 7 in.; displacement, 84 tons; 1500 horsepower; speed, 23·5 knots; armament, two 1·4-in. Q.-F. guns, and two torpedo-tubes. It should be noted that the last specimens of this type of first-class torpedo-boat have exceeded their estimated speed. No. 201, built by M. Normand, steamed 27·7 knots instead of 23·5 knots estimated.

Trials. Charles Martel. We mentioned last year that the trials of the Charles Martel were delayed owing to the substitution of weldless tubes for the boiler-tubes with which she had been previously supplied, a step which was taken in other cases after the accident on the Jauréguiberry. The Charles Martel is now in commission in the Mediterranean Squadron. On her full power trial the engines developed 14,996



"MASSÉNA,"

FRENCH BATTLESHIP.

horse-power, the consumption of coal being 1·751 lbs. per horse-power per hour, the mean speed being 18·13 knots. On the twenty-four hours' trial the speed was 17 knots, and on the consumption trial at 12,000 horse-power, 17·8 knots. At full speed, with all the guns pointed to the side to which the vessel was turning, and with the helm hard over, the vessel heeled less than five degrees. From full speed the engines were reversed in forty seconds.

The Masséna was built at St. Nazaire from the designs of M. de Bussy, and has been completed at Brest. The principal dimensions are: Length, 384 ft. 10 in.; beam, 66 ft.; draught of water aft, 27 ft.; displacement, 11,924 tons; horse-power, 13,500; speed, 18 knots. The hull is of steel, as in all modern ships, but the Masséna, like the Brennus, has no ram, thus showing that in her case ramming is considered of secondary importance. The Masséna is one of the few French ships which does not possess a complete water-line belt. The belt, which is 17¾ in. thick between the two principal turrets, diminishes to 9¾ in. towards the ends, terminating some distance from the stern in a bulkhead. The ship's form is continued aft with thin plates only. With her two armoured decks the Masséna has horizontal protection of 5·1 in. of steel. The hatchways, the funnel casings, the conning-tower, and the torpedo-captain's posts are armoured. The 12-in. and 10·8-in gun turrets are protected by 15¾-in. armour on the moving parts, and by 13¾-in. armour on the fixed parts. The turrets of the 5·5-in guns are plated with armour 4¾ in. thick. The Masséna is the second ship of the French Navy (the Dupuy de Lôme being the first) to be fitted with three independent engines and triple screws. There are twenty-four Lagrafel and D'Allest boilers distributed in three groups of eight each. The total grate area is 1076 sq. ft., and the heating surface is 32,287 sq. ft. There are two funnels. The weight of the propelling machinery, etc., is 553 tons. With natural draught 9200 horse-power will be developed with about 105 revolutions, and with full power 13,500 horse-power, with 126 revolutions, the corresponding speeds being 17 and 18 knots. The coal supply is unfortunately very small—635 tons—and the distance that can be steamed is 4000 miles at 10 knots, and 800 miles at full speed. **Masséna.**

The armament includes two 12-in. guns mounted the one in the forward turret at 22 ft. 2 in., that in the after turret 15 ft. 7 in. above the water-line; two 10·8-in. guns in turrets on either beam with a command of 15 ft. 11 in. The quadrilateral system has been abandoned in the most recent battleships. The four large guns are mounted on cast steel cradle mountings. The

secondary armament consists of eight 5·5-in. Q.-F. guns on controlled and self-acting recoil mountings. These guns also are in closed turrets, and are grouped in pairs about the principal guns. Eight 3·9-in. Q.-F. guns are mounted above the other pieces on the upper deck. Twelve 1·8-in. and twelve 1·4-in. guns are distributed in the military tops, on the flying deck, etc. This arrangement of the armament permits of eleven guns being used on either broadside. In order to give the 5·5-in. and 3·9-in. guns the maximum arc of fire their sights are sometimes placed on the right and sometimes on the left side of the gun. The big guns can fire one shot every four minutes with an initial velocity of 2788 ft. per sec. Four steel 18-in. torpedo-tubes are fitted between the armoured deck and the main deck—two on each broadside. There are besides two submerged tubes below the armoured deck.

The Masséna is remarkable for the fineness of her ends and for her clean run, the former necessitating a reduction in the berthing space for both officers and crew. On the preliminary trials, with 13,850 I.H.P. and 129·3 revolutions, the speed was 16·97 knots.* The Masséna is to replace the Hoche as flagship in the Northern Squadron.

Second-class cruisers.

The second-class cruisers Duchayla and Cassard have completed their trials. They are sister-ships of the Bugeaud type, but slightly larger, a type which will not be repeated. Length, 325 ft. 6 in.; beam, 44 ft. 11 in.; draught of water aft, 20 ft. 6 in.; displacement, 3952 tons; horse-power, 9500; estimated speed, 19·25 knots. Armament: six 6·4-in., four 3·9-in., ten 1·8-in., and three 1·4-in. Q.-F. guns, two revolver guns, and two torpedo-tubes.

Duchayla.

The Duchayla on her natural draught trial with 3540 horse-power, 107 revolutions, consuming 1·58 lbs. of coal per I.H.P. per hour, attained a speed of 15·15 knots. With all furnaces alight, the engines developing 7666 horse-power, and consuming 2·09 lbs. per I.H.P. per hour, the speed was 18·8 knots. On the twenty-four hours' trial, the speed was 17·8 knots. On the full power trial, with modified forced draught, 10,009 horse-power, and 147 revolutions, and a consumption of 2 lbs. of coal per I.H.P. per hour, the speed was 20·2 knots. After her trials the Duchayla is to be fitted with bilge keels. A similar step has been taken in the case of the Dupuy de Lôme and Chasseloup-Laubat, and as the experience with them has been satisfactory, all the protected cruisers will be fitted with bilge keels.

Cassard.

The Cassard, on her twenty-four hours' trial, with 6100 horse-power and 120 revolutions, and a coal consumption of 1·6 lbs. per I.H.P.

* A more recent trial has been unsuccessful.

per hour, obtained a speed of 17·5 knots. On the full-power trial, with 10,143 horse-power, 137·8 revolutions, and a coal consumption of 1·9 lbs. per I.H.P. per hour, the speed was 19·8 knots. These two cruisers exceeded their estimated speed and horse-power. The D'Assas, which is of the same type as the above, has finished her trials. She steamed 19·8 knots. **D'Assas.**

Galilée. The third-class cruiser Galilée, of 2317 tons, which was described last year, is in commission. She steamed 20 knots on her trials, as estimated.

Refits. Most of the battleships of the second line are undergoing important refits. These include new boilers—generally the substitution of water-tube for marine boilers—the replacing of the main armament by guns of smaller calibre but greater power, and the improvement of the protection of the auxiliary armament. In certain battleships the refit includes a reduction of the superstructure where this is exaggerated. The refits already begun on several ships will spread over the years up to 1900. The expenditure amounts to £1,059,909, and will be distributed among the following ships:—battleships Formidable, Courbet, Redoutable, Amiral Baudin, Hoche, Marceau, Dévastation, Neptune, Amiral Duperré, and Magenta; coast-defence ships Caïman, Requin, Terrible, Indomptable, and Furieux. The work on the Formidable is finished. The centre barbette with its 14·6-in. gun has been removed and replaced by two redoubts armed with four 6·4-in. guns. She has been fitted with new boilers of the Admiralty type, with which she has regained her speed of 16 knots. She steamed 15·2 knots with three-fourths of her furnaces alight, using petroleum and coal mixed. The Amiral Baudin, like the Formidable, loses her centre barbette and 14·6-in. gun, which will be replaced by four 6·4-in. guns. The minor armament will be modified, and the after military mast removed. The new armament will be as follows:—two 14·6-in. guns mounted forward and aft in barbettes, four 6·4-in. Q.-F. guns in an armoured redoubt amidships, four 6·4-in. and eight 5·5-in. Q.-F. guns in the battery, sixteen 1·8-in. and six 1·4-in. Q.-F. guns in the tops and on the upper works, and four torpedo-tubes. In the Courbet, boilers of the Admiralty type have also been fitted. Her armament has been modified by the substitution of 10·8-in. guns for the four 13·4 guns of the redoubt, and 9·4-in. guns for the 10·6-in. guns of the barbettes. The new guns are of the 1893 model. The refit of the Requin is in progress. She is receiving Niclausse boilers, and her two 16·5-in. guns are being replaced by 13·4-in. guns. Her sister ships, the Terrible, Indomptable, and Caïman, are to receive the same armament. The coast-defence ship Furieux will be supplied with

9·4-in. guns in place of her 13·4-in. guns. The Hoche will go out of commission as soon as the Masséna is ready for sea, and will be supplied with sixteen Belleville boilers of the 1896 model, fitted with economisers, and of 12,000 horse-power. Confining ourselves to work actually in progress, we may note that the Redoutable, which was the first steel battleship, is having the four 10·6-in. guns in the central redoubt replaced by 9·4-in. guns, and her six 5·5-in. guns by the same number of 3·9-in. guns. An armoured post is being provided for the commander.

The second-class torpedo-boat No. 133 was sunk last autumn near Algiers by the first-class torpedo-boat Doudart de Lagrée, during night manœuvres, when all lights were out.

Germany.

The Emperor William has long cherished the idea of possessing a powerful Navy, but until recently the Reichstag has refused to follow in his footsteps. Last year, in spite of the insistence of the Government, it struck out of the list of new constructions two cruisers, one gunboat, one torpedo-division boat, and eight torpedo-boats, and only passed the votes for laying down one battleship, the Ersatz-Konig Wilhelm, a sister ship to the Kaiser Wilhelm II. and the Kaiser Friedrich III., which we speak of later, and two gunboats, intended to replace the Hyane and Iltis. A partial Ministerial crisis ensued on this action. The Minister of Marine resigned, and was replaced by Admiral von Tirpitz, who appears to be more master of his language than his predecessor. The Emperor then had drawn up a programme for the Navy, which, on account of its resemblance to the system adopted in the case of the Army, has been called the Naval Septennate. The Reichstag in this Bill is asked to vote all expenses for the Imperial Navy for seven years, and will hardly be able to intervene in Naval matters until the end of the period, unless the Admiralty demands additional sums for shipbuilding, or for armaments not provided in the Bill. Germany will still, after the programme is carried out, remain a second-rate, or rather a third-rate Maritime Power. The adoption of a fixed standard of Naval strength appears a strange idea when the difficulty of foretelling the future progress of science, and the changes it brings about in Naval *matériel*, is borne in mind.

An incident in Hayti, which was followed by the despatch thither of two warships, and the occupation of the Bay of Kiao-Chao, in China, have admirably served the plans of the Admiralty by exciting the chauvinism of the subjects of the German Emperor. But it is

only just to admit that German commerce abroad has made great developments, and that her Mercantile Marine has considerably increased in the last few years. In steam tonnage, Germany comes immediately after the United Kingdom, but the difference between the tonnages of the two Powers is enormous, and the time does not appear very near when the German Mercantile Marine, in spite of its high ambitions, will equal that of Great Britain.

The Naval Septennate provides the following sums for the Naval Service from 1898–9 to 1904–5 :—

	Total Expenditure.		Expenditure on New Construction and Armaments.	
	Million Marks.	£	Million Marks.	£
1898–9 . . .	121·7	5,756,135	51·4	2,516,031
1899–1900 . .	131·6	6,441,822	55·5	2,716,726
1900–1 . . .	144·7	7,083,068	64·6	3,162,171
1901–2 . . .	148·4	7,264,183	64·3	3,147,486
1902–3 . . .	150·5	7,366,978	62·4	3,054,481
1903–4 . . .	150·6	7,371,873	58·5	2,863,576
1904–5 . . .	149·7	7,327,818	53·6	2,623,721

The Navy Estimates for 1897–8 rose to £5,875,000, while in 1873 they only amounted to £1,300,000, and in 1888 to £2,500,000.

Under the Bill the strength of the Navy, excluding torpedo-boats, training-ships, gunboats, and special service vessels, is to be fixed at seventeen battleships, eight coast-defence ships, nine large and twenty-six small cruisers, distributed in two squadrons. Two battleships, three large and four small cruisers will constitute a reserve. The division of the Far East will consist of two large and three small cruisers and two gunboats. The interests of the Empire in Central and South America will be protected by one large and three small cruisers; in the Indian Ocean and East Africa by two groups of two gunboats each. As the fleet built and building is represented by twelve battleships, eight coast-defence ships, ten large and twenty-three small cruisers, the proposed new construction comprises seven battleships, two large and seven small cruisers. The expenditure on these vessels, including gunboats and torpedo-boats built to replace other ships of the same class which will have to be struck off the list during the Septennate, will be over £20,500,000, distributed as follows:—

	Million marks.	£ sterling.
Increase of the Fleet.	162·2	7,939,694
Replacement of old vessels. . . .	211	10,328,454
Gunboats	4·8	234,960
Torpedo-boats	41·3	2,021,636
Total . . .	419·3	£20,524,744

In addition to the above, £3,108,326 will be spent on ships already building, thus making a total sum of £23,633,070, which the German Government intend to spend on new construction before and including 1904–5.*

The activity in the German shipbuilding yards has been considerable. The methods of work have been improved, and the rate of construction has become more rapid. The firm of Krupp, which had already absorbed the Gruson establishment, has bought the Germania Shipbuilding Yard, and has thus become a most powerful organisation for warship building, possessing the means of constructing hulls and manufacturing guns and armour.

The total numbers voted for the Navy in 1898–9 are 24,713. They include 713 officers on the active list, of whom two are admirals, two vice-admirals, eleven rear-admirals, forty-two captains, and seventy-seven commanders. The senior captains have eight years' service in the rank, and twenty-eight to thirty years' service altogether. The maximum periods of service in the rank for commanders, lieutenant-commanders, lieutenants and sub-lieutenants are respectively thirty-three, eighteen, ten and three years.

Ships launched.

On the 14th of September last the battleship Kaiser Wilhelm II., of 11,130 tons displacement, was launched at Wilhelmshaven. Her sister ship, Kaiser Friedrich III., is completing afloat, and will go through her trials this year, while a third ship of the same class was authorised by the Reichstag in the Session of 1896–7. The Kaiser Wilhelm II. was launched eleven months after the laying of her first keel-plate. The admirable results realised in the English yards have aroused the emulation of other Navies. In this respect the Germans are making great progress. Twenty-one months elapsed between the laying down and the launch of the Brandenburg; sixteen months in

* The Clerical party has suddenly come forward with a proposal to make a very important change in the Navy Bill, and their scheme was accepted by a large majority of the Budget Committee and also by the Secretary of State for the Marine on behalf of the Government. The proposal is that the German Navy should be raised to the strength contemplated by the Government Bill at the end of six instead of seven years, as the Government had originally demanded. At the same time, the Reichstag is declared not to be bound to provide more than 408,000,000 marks during that period for non-recurring expenditure, or to approve an average increase of more than 40,000,000 marks in the annual recurring expenditure during these years, as compared with the estimates for the present year. So far as the Government scheme cannot be carried out on these terms before the close of the financial year 1903, its execution is to be postponed beyond that year. Rear-Admiral Tirpitz, in accepting the Clerical proposal with gratitude on behalf of the Government, said that it involved material military and political advantages. The *North German Gazette* says that the Clericals have done a great service by bringing forward this proposal. In the committee itself, Dr. Lieber, the Clerical leader, said that the curtailment of the period for raising the Navy to the standard of the Government Bill had the great advantage that it rendered it more probable that the estimate of the cost would prove correct. The reduction in the amount to be voted is, of course, only apparent and not real, the amount for renewals which will have to be expended in the financial year 1904 having to be taken into account.—*Times* telegram, Berlin, March 6th.

the case of the Kaiser Friedrich III. The new battleship has been designed by Herr Dietrich, the Chief Constructor of the German Navy. We need not repeat the description given at p. 32 of the *Naval Annual* for 1897. Protection is provided by a belt 6 ft. 6 in. in depth, 12 to 14 in. in thickness, extending from the bow for four-fifths of the length of the ship; by an armoured deck 2½ in. in thickness—abaft the belt it is 3 in. thick—which meets the lower edge of the water-line belt, and slopes down forward to support the ram; and by a ¾-in. splinter-proof deck. The water-tube boilers are of the Durr type, and the normal coal-supply is 650 tons, which can be raised if needed to 1000 tons. The weight of broadside which can be delivered in one minute is as follows:—

	Shots.	Lbs.	Ft. Tons.
4 9·4-in guns	4	1895	56,200
18 6-in. Q.-F.	54	4763	199,962
12 3·5-in.	90	1985	77,850
Total	148	8644	334,012

The smaller guns have not been included in this calculation. The gun-power of the new battleship exceeds that of the Brandenburg class by more than one-third, although the displacement is only 1000 tons greater. The torpedo armament includes five 18-in. submerged tubes, four on the broadside and one in the stem; the sixth tube is aft and above water. The Kaiser Wilhelm has two masts; the foremast, with a stairway inside, carries light Q.-F. guns and a powerful search-light. The mainmast also carries a search-light, but will only be used for signalling; four other search-lights are carried, 13 ft. above the water-line. The ship will cost in round figures £700,000, and the complement will be 655 men.

Fürst Bismarck.

The armoured cruiser known hitherto as the Ersatz-Leipzig, and now named the Bismarck, has been launched at Kiel. She was laid down in April, 1896. Displacement, 10,650 tons; length, 393 ft. 8 in.; beam, 67 ft.; draught, 26 ft. The vessel will be propelled by three screws; speed, 19 knots; I.H.P., 14,000; coal-capacity, 1000 tons. The hull is protected by a Harveyed steel belt which extends from stem to stern, and has a depth of 7 ft. 5 in. The thickness of the principal armoured deck is 1·9 in., and there is a second armoured deck aft below the armoured belt. The armament will consist solely of quick-firing guns and machine-guns; there will be four 9·4-in. guns coupled in two turrets protected by 8 in. of nickel steel; twelve 6-in. guns in separate casemates or small turrets amidships; ten 3·6-in. guns behind shields, and ten 1·4-in. guns. The Bismarck has six torpedo-tubes for 18-in. torpedoes, all, with

the exception of the stern tube, being below the water-line. The complement will be 565 men. It is anticipated that she will not be completed until the autumn of 1899.

Second-class cruisers.

The second-class cruisers Freya, Hertha, and Victoria Luise were launched last spring *—the first at Dantzig, the second at Stettin, and the third at Bremen. Length, 344 ft. 5 in.; beam, 57 ft.; mean draught, 21½ ft.; displacement, 5650 tons. They have three propellers driven by independent vertical triple-expansion engines, which are to develop 9000 horse-power and give a speed of 18·5 knots with natural draught. The Hertha has Belleville, the Victoria Luise Durr, and the Freya Niclausse boilers, thus enabling interesting comparisons to be made between the three types. The normal coal supply, excluding that contained in the reserve bunkers, is 500 tons. Protection is afforded by an armoured deck 1·6-in. thick on the horizontal portion and 3·9-in. thick on the sloping sides. A cofferdam filled with cork extends for a length of 230 ft., and is protected with 3-in. armour. The armament comprises two 8·2-in. guns, mounted one forward and one aft, in turrets; and eight 6-in. Q.-F. guns, mounted singly, four in turrets on the upper deck and four in casemates on the main deck, both turrets and casemates being protected by 4-in. armour; ten 3·4-in Q.-F. guns protected by shields, ten 1·4-in. Q.-F. guns, four machine-guns and three torpedo-tubes, of which two are submerged and on the side, and one forward above the water-line.† The complement is 439 men. These cruisers, which have been designed by Herr Dietrich, should be completed in 1898.

A fourth-class cruiser has been laid down at the Germania Yard, Kiel, of which the principal dimensions are:—Length, 328 ft.; beam, 38 ft. 7 in.; draught of water aft, 15 ft. 9 in.; displacement, 2650 tons. Two triple-expansion engines developing 6000 horse-power will give the vessel a speed of twenty knots. She will be protected by a 2-in. armour deck, and the armament will comprise ten 4·1-in. Q.-F. guns and twelve smaller guns.

Amongst the miscellaneous facts to be noted are the experiments carried out with balloons of 500 cubic metres in volume, the experiments with the Marconi system of wireless telegraphy for distant signals, and the capsizing of the Schichau torpedo-boat No. 26, commanded by Lieut. the Duke of Mecklenburg-Schwerin, at the entrance of the Elbe, a disaster in which seven men, beside the commander, were drowned.

* The Vineta (ex M) and Hansa (ex N) have been launched recently.

† This tube is probably also submerged.—Ed.

Italy.

The Navy Estimates for 1897–98 amount to £4,000,000, an increase of more than £150,000 on last year. Italy had drawn up a programme for the reconstitution of her fleet, but there is at present a deficiency in the number provided in the programme of eighty-nine vessels, viz., one first-class battleship, one large cruiser, ten torpedo-cruisers, ten look-out ships, five gunboats, and sixty-one torpedo-boats. For reasons which we cannot enumerate here, amongst which the war in Africa is the most important, Italy has been obliged to restrict her programme. The crisis seems now to be passed, and this year the principal items in the estimates, including that for new construction, have been increased. A division of six torpedo-boats has been added to the Mediterranean Squadron, a reserve division has been created, and the *personnel* of the Fleet has risen from 22,416 to 23,500 men.

The ships on the stocks or completing afloat are as follows:—Battleships: Admiral St. Bon, at Venice; Emanuele Filiberto, at Castellamare; Garibaldi, at Sestri Ponente; Varese, at Leghorn; Carlo Alberto, at Spezzia; Vettor Pisani, at Naples; the third-class cruiser Puglia, at Tarento; the torpedo-cruisers Agordat and Coatit, at Castellamare. Many of these ships have been in the water more than a year, but most of them are not as far advanced as was estimated, a fact which has attracted the attention of the Budget Committee of the Chamber. It complains through its reporter of the misapplication of the money voted and of false economies, to which it attributes the delay in the substitution of new for old ships; it believes that the eighty-nine vessels mentioned above ought already to have been handed over to the Navy, and that the expenditure still required upon them will amount to £4,060,000.

If the activity of a Navy was only measured by the number of ships launched Italy would have no reason to be dissatisfied, for during the year four armoured vessels have been launched, of which the most important are the Admiral St. Bon and the Emanuele Filiberto. These ships were laid down at the end of 1893, thus showing that Italy has not yet adopted in her dockyards the methods of construction which enable other Navies to build the largest ships in from twenty months to four years. The principal dimensions of these two battleships are: Length, 344 ft. 6 in.; beam, 69 ft. 4 in.; draught of water aft, 24 ft. 9 in.; displacement, 9800 tons. Protection is afforded by a complete water-line belt of nickel steel 10 in. thick amidships, tapering to 4 in. at the ends. Above this belt the side is protected for the whole length of the battery by 6-in. armour. The roof of the battery consists of 2-in. steel plates. The turtle-back deck Battleships.

extends the whole length of the ship, 1½ in. thick on the horizontal and 3 in. thick on the sloping portion. Further protection is afforded by minute subdivision into water-tight compartments, and by coffer-dams filled with water-excluding material. There are two propellers, each driven by a vertical triple-expansion engine, to which steam is furnished by twelve cylindrical boilers; with natural draught, 9000 horse-power will be developed, and the speed will be 16 knots; and with forced draught 13,500 horse-power and a speed of 18 knots. The coal supply is fixed at 1000 tons (viz., 400 tons beyond the amount carried at load draught), without reckoning liquid fuel. The armament comprises four 10-in. guns, mounted in pairs, in barbettes, one forward, one aft, and protected by 10-in. armour; eight 6-in. Q.-F. guns in the battery, isolated by means of screens, four of which are in angle-ports, giving bow and stern fire, and the other four on the broadside; eight 4·7-in. Q.-F. guns, firing two ahead, two astern, and two on each broadside; eight 2·2-in. and twelve 1·4-in. Q.-F. guns. There are five submerged torpedo-tubes, four of which are on the sides and one abaft.

Garibaldi. Varese. The armoured cruisers Giuseppe Garibaldi and Varese have been launched, and will replace the vessels sold to the Argentine Republic and Spain, with the consent of the Italian Government. The principal dimensions are: length, 328 ft.; beam, 59 ft. 8 in.; draught of water aft, 24 ft.; displacement, 6840 tons. They are protected by a complete water-line belt of nickel steel 6 in. thick, and by armour of the same thickness above, extending for a length of 197 ft., and thus protecting the base of the two armoured turrets. The deck above the battery consists of 3·4-in. plates. The main armoured deck is 1·4 in. in thickness. Two vertical triple-expansion engines, each driving one propeller, and to which steam is supplied by eight cylindrical boilers, are to develop 13,500 horse-power, and to give a speed of 20 knots. The coal supply is 1000 tons, with the reserve bunkers full, but excluding liquid fuel. The armament comprises two 10-in. guns in turrets, protected by 6-in. armour; ten 6-in. Q.-F. guns in the battery; six 4·7-in. Q.-F. guns protected by shields; ten 6-pdrs., ten 1-pdrs., two Maxims, and five torpedo-tubes.

Calabria. The results of the trials of the cruiser Calabria, of 2442 tons, have been published in the *Rivista Maritima*. On the six hours' natural draught trial, with seventy-eight revolutions and 2439 horse-power, the speed was 14·5 knots; on the forced draught trial with 137 revolutions, the power developed was 4094 horse-power and the speed 16·4 knots. The propelling machinery was made by Hawthorne, Guppy & Co., and consists of two triple-expansion engines and four boilers. The hull is sheathed with wood and zinc,



"CARLO ALBERTO"

ITALIAN ARMOURED CRUISER.

and the armoured deck is 2 in. thick. The armament consists of four 6-in., six 4·7-in., and eight 2·2-in., besides smaller Q.-F. guns and two submerged torpedo-tubes on the broadside.

The armoured cruiser Carlo Alberto, of 6500 tons, 13,000 horse-power, and 20 knots speed, has commenced her trials at Spezzia. She and her sister ship, the Vettor Pisani, resemble in many respects the Varese and Garibaldi, but they are of less displacement, and their main armament is composed of guns of smaller calibre, the two 10-in. guns of the Varese type being replaced by two 6-in. guns in the Carlo Alberto. Carlo Alberto.

In the course of last autumn the Italian Navy undertook important manœuvres in combination with the Army, the object of which was to discover under what condition the coast should be defended in case of attack from the sea.

The protected cruiser Giovanni Bausan had an accident in Suda Bay which caused the loss of six men.

Interesting experiments in wireless telegraphy have been carried out with the apparatus invented by Signor Marconi. Telegrams have been exchanged between two ships at a distance of ten miles.

Eight merchant steamers have been fitted for service as auxiliary cruisers in time of war: the North America (4826 tons), Victoria (4300 tons), Duca di Galliera, Duchessa di Genova, Regina Margherita, Electrico, Candia, and Malta. All are to carry an armament of Q.-F. guns.

Russia.

The Russian Navy Estimates for 1898* amount to 68,055,420 roubles (£7,089,106), for new construction, and (£16,146) for the extension of the Port of Vladivostok. Like all the great Powers, Russia is carrying out a programme for the increase of her Fleet, and has during the last few years considerably increased her shipbuilding resources, a full description of which is given in Chapter IV.

The numbers voted for the Russian Navy in 1898 comprise 2627 officers and 29,850 men.

The shipbuilding in progress for the Russian Navy includes the battleships Peresviet and Oslabya, of 12,674 tons, and the Kniaz Potemkine Tavritchesky,† of the Tri Sviatitelia type, recently laid down at Nicolaieff; the armoured cruiser Gromoboi,‡ 12,336 tons, of the Rossia type, building at the Baltic Works, the cruisers Aurora, Diana and Pallada, of 6635 tons, four destroyers of the Sokol type,

* A special grant of £9,000,000 to be spread over the next seven years has been allotted to new construction.—Ed.

† For particulars see p. 92.

‡ *Cf.* p. 93.

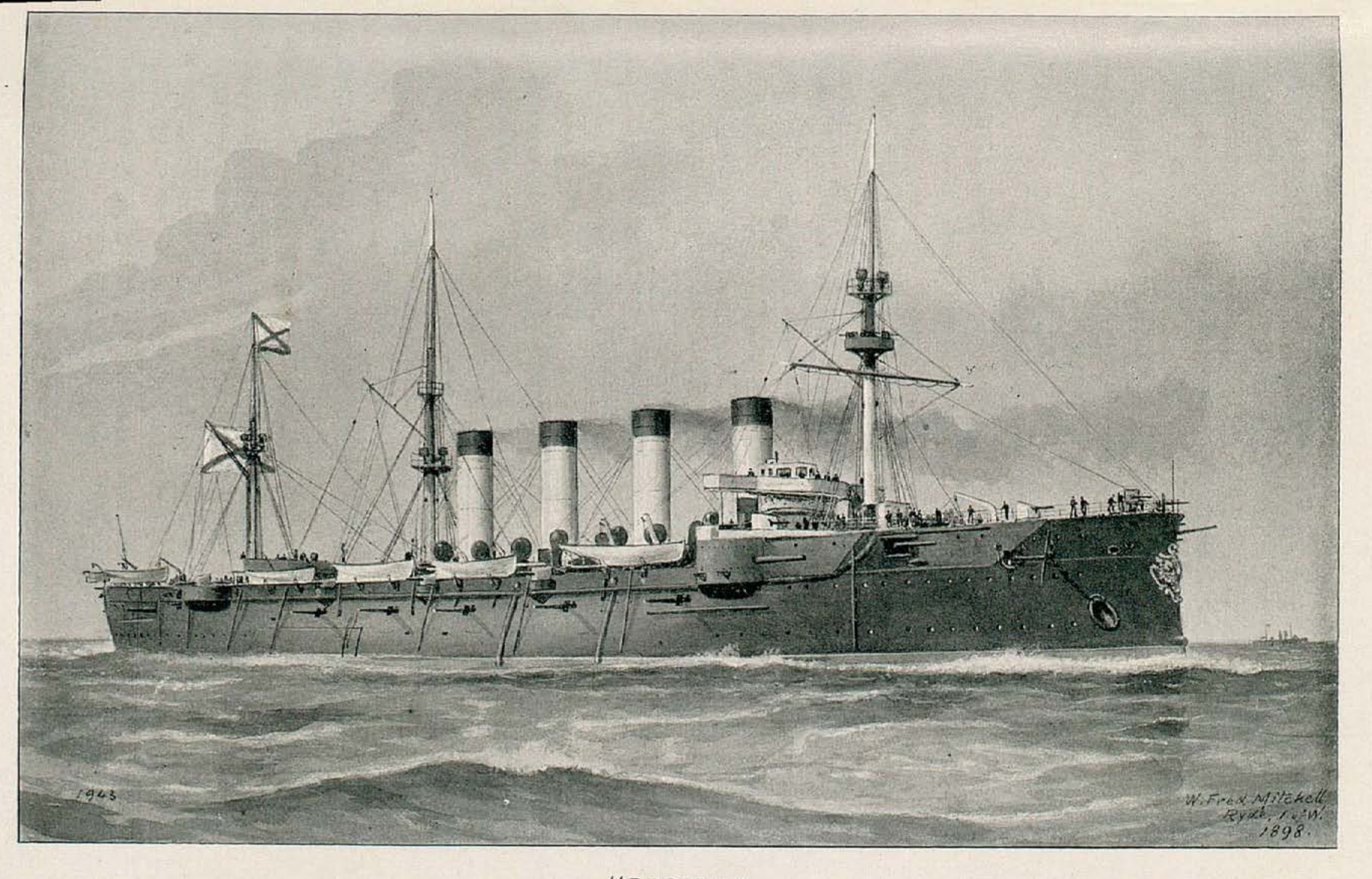
and eight sea-going torpedo-boats of 21 knots speed. A battleship of the Rostilav type is projected.*

Rossia. The Rossia was present at the Jubilee Review. She has already been described in these pages, but the following notes made by the writer after a visit to the ship may be of interest. The general characteristics of the Rossia are very similar to those of the Rurik. There is the same splendid expanse of unencumbered deck, the same defective arrangement for the supply of ammunition from either end of the battery deck, the same absence of protection for the armament, and similar distribution of the guns. Like the Rurik, the Rossia has a high top-gallant forecastle, but she is more lightly rigged and carries no yards except upon the foremast. Sail power in her case has been abandoned. The armament consists of four 8-in., sixteen 6-in. Canet Q.-F. and twelve 3-in. Canet Q.-F. guns, besides Hotchkiss, etc. The 8-in. guns are carried on the upper deck, as in the Rurik. Between them are mounted four 3-in. Q.-F., protected by light shields and five small Hotchkiss Q.-F. on each broadside. The bulwarks are low and the boats are carried on the rail. Of the sixteen 6-in. guns three are carried on the upper deck under the forecastle, one firing right ahead, the others on each bow; one is carried on the upper deck aft. The remainder are mounted in the main deck battery, and are separated by 1½-in. screens, which extend halfway from the side to the centre of the ship. These would much diminish the effect of shells bursting in the battery, and constitute an important improvement over the Rurik. The battery is protected from raking fire by 5-in. tranverse bulkheads both forward and aft. Besides the 3-in. guns already mentioned, two are mounted on the top-gallant forecastle, and one on either quarter. The belt is 10 in. thick, and extends for about two-thirds of the length of the ship. There is a patch of 5-in. armour on the side above the belt in way of the engine room and boiler space. There is 2½-in. armour round the engine-room hatch. There are three propellers. The centre engine is smaller and placed abaft the two side engines. With the centre engine alone the speed is 10½ knots, the side propellers being allowed to revolve when this is used. For higher speeds the two side engines alone are used and the centre propeller is feathered.

Peresviet. The battleships Peresviet, building at the Baltic Works, and Oslabya, building at the New Admiralty Yard, have three propellers, driven by three engines, developing a total of 14,500 horse-power. Steam will be furnished by thirty Belleville boilers.

Gilyak. The twin-screw gunboat the Gilyak has been launched from the Admiralty Yard on the Neva. Length, 200 ft.; beam, 37 ft.;

* Doubtful.—Ed.



"ROSSIA,"

RUSSIAN ARMOURED CRUISER.

displacement, 963 tons. The triple-expansion engines of 1000 I.H.P. are being made by Creighton & Co., at Abo, in Finland. The armament consists of one 4·7-in., five 2·9-in. guns, four 1·8-in. Hotchkiss guns, and two 2·5-in. for landing purposes. There is also a bow torpedo-tube. The Gilyak has Belleville boilers, and is intended for Chinese waters.

On June 4th the Grand Duke Alexis laid the silver keel plates of the cruisers Diana, Aurora, and Pallada, which are being constructed on the Neva. Displacement, 6630 tons; length, 413 ft.; beam, 55 ft. 9 in.; draught, 21 ft. They will have engines of 11,600 horse-power supplied with steam by twenty-four Belleville boilers, and driving three screws. Speed, 20 knots. The armament will consist of six 5·9-in., six 4·7-in., and twenty-seven other Q.-F. and machine-guns. **Aurora.**

The Russian Admiralty is about to order, from the Forges et Chantiers de la Mediterranée, an armoured cruiser, of which the designs have not yet been finally settled. She will be of 7800 tons displacement, with a water-line belt extending from the stem for some distance aft. The armament will be mounted in closed turrets and in armoured casemates. The conditions of the contract provide for a speed of 21 knots, to be maintained for twenty-four hours.

Amongst the ships that have gone through their trials we must first mention the Petropavlovsk, which was built at the new Imperial Dockyard at St. Petersburg. The Petropavlovsk is 367 ft. 6 in. between perpendiculars, 69 ft. beam, and has a displacement of 10,960 tons at a mean draught of 26 ft. The armour is of nickel steel, and was manufactured in the Ijora Works. The armament includes four 12-in. guns and twelve 6-in. Q.-F. guns, and four torpedo-tubes. Her machinery is by Messrs. Hawthorn, Leslie & Co., and consists of two sets of triple-expansion engines developing 10,600 I.H.P. under natural draught. Steam is supplied by fourteen single-ended boilers, each about 14 ft. 6 in. diameter and 10 ft. 6 in. long, having a heating surface of about 27,000 square feet, and a grate area of 1040 square feet, the working pressure being 125 lb. per square inch. "The trials," says the *Times*, "were of a satisfactory character, the full power trial of twelve hours passing off without hitch, steam being easily maintained with natural draught. The engines developed the contract power at a speed of eighty-four and a half revolutions per minute without trouble of any kind." The speed was 17·5 knots. The mean of four runs on the measured mile gave a speed of 16·84 knots, with 84 revolutions and 10,399 horse-power. **Trials of Petropavlovsk.**

The torpedo gunboat Abrek, built at Abo, has completed her trials. **Abrek.**

Length, 212 ft.; beam, 24 ft.; displacement, 535 tons. She steamed 21·2 knots, with 4506 horse-power and 267 revolutions.

Svietlana.

The cruiser Svietlana, built at Havre by the Forges et Chantiers de la Mediterranée, is of 3828 tons displacement, and her estimated speed is 20 knots. She was fully described in the *Naval Annual* of 1896. On the full power trial the mean speed attained was 20·2 knots, with 10,065 I.H.P.

Accident on Sissoi Veliky.

A terrible accident took place, at Canea, on board the battleship Sissoi Veliky. During gunnery practice the breech of one of the 12-in. guns in the after turret was blown off, causing great damage and killing twenty-three men, including two officers. The cause of the accident appears to be as follows. The system of closing the breech is by a continuous rotary movement, but there is no safety appliance preventing the gun being fired before the complete closure of the breech. This regrettable omission was aggravated by the fact that the appearance of the breeches of the two guns when closed is not the same in the closed position, and for this reason the cause of the accident is supposed to have been, that the two breeches were thought to be closed, because they presented the same appearance, whereas one was closed and the other was not. The breech when blown off was hurled backwards like a projectile, made a huge dent in the interior wall of the turret, and fell into the sea some distance away from the ship. The gas of the powder filled the turret, and as this was completely closed, the enormous pressure burst the roof up, and bent the vertical plates of armour from their upright position. One of the fragments of the roof fell in the sea, the other, after having passed over the mainmast, smashed the bridge, killing there ten men, and then crashed through the upper and spar deck. A half-practice charge of about 200 pounds of prismatic powder sufficed for this terrible accident. The Sissoi Veliky was rendered unfit for service for several months, but has been completely repaired at La Seyne, and left at the commencement of the year for the far East.

Gangut.

On the 25th June the battleship Gangut, of 6627 tons, launched in 1890, touched on an unknown rock near Viborg. The ship went to the bottom, but all the crew were saved. The Admiralty has treated with the Swedish Neptune Co., which refloated the Howe after her stranding at the entrance to Ferrol, for raising the Gangut. She lies in fifteen fathoms on a rocky bottom.

Various experiments with petroleum fuel are in progress on the old ironclad Admiral Grieg. As all the new ships and all torpedo-boats are to be fitted for using mazout (residue petroleum), tanks to contain 17,000 tons of this fuel are to be built at Cronstadt.

The Russian Admiralty has just ordered from Messrs. Armstrong,

Whitworth & Co. an ice-breaking ship of 10,000 horse-power, of which the design is due to Vice-Admiral Makaroff. This ship is intended to keep open communication with St. Petersburg in winter, and in summer to open a passage through the Kara Sea. It is also said that she will be used for exploring the Arctic Ocean, and will attempt to reach the North Pole.

Austria-Hungary.

The Navy Estimates for 1898 amount to 10,563,060 florins (£880,255) ordinary expenditure, and 3,918,200 florins (£326,516) extraordinary expenditure, representing together an increase of 500,000 florins (£41,666) on the Budget of 1897. The Naval officers' list has been augmented by one rear-admiral, one captain, four commanders, three lieutenant-commanders, twenty-five lieutenants, and sixteen sub-lieutenants.

The Zenta, a torpedo-cruiser of 2300 tons, was launched at Pola. **Zenta.** Her dimensions are as follows: Length, 312 ft.; beam, 37 ft. 3 in.; draught aft, 14 ft. 2 in. Engines, of 7800 I.H.P., are to give a speed of 20 knots. She is armed with eight 4·7-in., ten 1·8-in. quick-firers, and two machine-guns. The armament is so disposed that five 4·7-in. guns can be fired on either broadside. There are seven torpedo-tubes.

The extraordinary estimates provide for the building of a coast-defence ship displacing 7800 tons, with a heavy armament, and a speed of at least 18·5 knots, to replace one of the obsolete Prinz Eugen class.

Four torpedo-boats have been ordered from Messrs. Yarrow, of Poplar. They are of the type Viper modified—displacement, 130 tons; speed, 26 knots.

The coast-defence ironclad Budapest has completed a successful **Budapest.** series of official trials at Pola, the following description of which, as compared with those of the sister ships Monarch and Wien, is condensed from the *Times*: "These vessels have been constructed from the designs of Herr Popper, of the Austrian Navy, and are in every respect similar except in the boiler installation. The Wien and Monarch are fitted with cylindrical boilers, and although it was originally intended that the Budapest should have cylindrical boilers, it was ultimately decided by the Austrian Government to substitute the water-tube type. All three vessels were tried at Pola, each loaded to the same displacement, and run over the same course. The principal dimensions of the vessels are as follows:

length, 305 ft.; breadth, 55 ft. 9 in.; draught, 21 ft.; displacement, 5550 tons. The machinery consists of two sets of triple-expansion engines having cylinders:—H.P., 33½ in.; I.P., 51 in.; L.P., 78¾ in.; stroke, 35½ in., steam being supplied in the case of the Wien and Monarch by cylindrical return-tube boilers having a total heating surface of 15,750 sq. ft. and grate area of 568 sq. ft., and in the Budapest by Belleville water-tube boilers having a total heating surface of 22,500 sq. ft. and grate area of 720 sq. ft. Appended we give comparative results of the natural and forced draught trials of the three vessels:—

NATURAL DRAUGHT TRIAL OF SIX HOURS' DURATION.

—	WIEN.	MONARCH.	BUDAPEST.
Number of revolutions	121·7	119·6	124
I.H.P.	6376	6110	6608
Steam pressure in boilers (lb. per sq. in.)	138	130	230
Air pressure	0·63	0·6	nil.
Speed	16·7	16·2	17·1

FULL POWER FORCED DRAUGHT TRIAL OF FOUR HOURS' DURATION (during two hours of which the vessel steamed over a measured course 17 knots).

—	WIEN.	MONARCH.	BUDAPEST.
Revolutions	131·2	135·76	135·6
I.H.P.	8480	8900	9185
Steam pressure in boilers (lb. per sq. in.)	149	145	199
Speed in knots	17·49	17·35	17·87
Number of stokehold ventilating fans	8	8	4
Air pressure	1¾	1¾	0·2

"The stokers were drawn entirely from the Austrian Navy. The coal used was Nixon's navigation, and, being measured in the case of the natural draught trial of the Budapest, the consumption was ascertained to be about 1·8 lb. per I.H.P. The representatives of the Austrian Government considered the results of the trials as highly satisfactory, both engines and boilers working smoothly throughout. Messrs. Maudslay, Sons, & Field were responsible for the boiler installation.

"It has been decided to fit Belleville boilers in the new armoured vessels which are building for the Austrian Navy."

BULGARIA.

A French commission, at the request of the Bulgarian Government, has drawn up a programme for the creation of a small Navy. At the present moment the nucleus of the *personnel* is being formed. A small cruiser has been ordered in France, of which the dimensions are: Length, 228 ft.; beam, 26 ft. 9 in.; draught, 10 ft. 6 in. Two vertical triple-expansion engines, developing 2600 I.H.P., are to give a speed of 17 knots. The vessel will be used as a training-ship. The Bulgarian Government intends to order later several first-class torpedo-boats.

DENMARK.

The ordinary Navy Estimates amount to 6,936,922 crowns (£382,010), an increase of 21,732 crowns (£1196); the Supplementary Estimates are slightly less, and amount to 5,285,568 crowns (£291,071). Nearly the whole of the 1,200,000 crowns (£66,083) devoted to new construction will be spent on the Herluf Tralle. Several ships are being refitted.

GREECE.

The three battleships of the Psara type, which were undergoing a refit at La Seyne when the Cretan Question sprang up, were hastily despatched to Greek waters, but, like the rest of the Greek Navy, did no effectual service during the war with Turkey. Except in the Gulf of Ambracia, where a few shots were exchanged with the Turkish forts, the Greek Fleet took no advantage of the absolute command of the sea which it possessed.

NETHERLANDS.

The States-General have refused to vote the sums demanded by the Government for the Navy, and the Minister of Marine has been changed. The three protected cruisers of 3900 tons displacement, 9000 I.H.P., and 20 knots speed, have been named the Gelderland, Brabant, and Utrecht. They will be armed with 6-in. and 3·7-in. Q.-F. guns, and four torpedo-tubes.

NORWAY.

A sum of £204,000 has been allotted to new construction in 1897–8, a part of which will be spent on the construction of two 85-ton,

one 50-ton, and one 25-ton torpedo-boats. £25,330 have been voted for the improvement of the forts of Toensborg and Christiansand, and other pressing works.

Tordenskjold. Messrs. Armstrong, Whitworth & Co. have launched the armour-clad Tordenskjold; she is a sister ship of the Harald Haarfagre, launched on the 4th January, 1897, by the same firm. The principal dimensions are: Length, 280 ft.; beam, 48 ft. 6 in.; mean draught, 16 ft. 6 in.; displacement, 3500 tons. Triple-expansion engines of 3700 I.H.P., driving two screws, are to give a speed of 16 knots. Armament: two 8-in. Q.-F. guns, mounted singly in gun-houses, 8-in. thick in front; six 4·7-in., six 12-pdrs., and six 1½-pdr. Q.-F. guns, with two torpedo-tubes. The vessel is protected by a belt varying from 7 in. to 4 in. in thickness, and an armoured deck. The conning-tower is plated with 6-in. armour.

Portugal.

A commission, at the head of which is the French Naval Constructor, M. Croneau, has been appointed to reorganise the dockyard at Lisbon, and to prepare the designs of new ships. Under its

Rainha d'Amelia. direction the third-class cruiser Rainha d'Amelia has been laid down. The dimensions are: Length, 246 ft.; beam, 36 ft.; draught of water aft, 14 ft. 8 in.; displacement, 1660 tons. Two vertical triple-expansion engines are to develop 3000 I.H.P. with natural and 4500 I.H.P. with forced draught, the corresponding speeds being 16 and 17·5 knots. Coal endurance at 10 knots, 4200 miles. Armament: four 5·9-in., four 3·9-in., and two 1·8-in Q.-F. guns and four machine-guns, besides torpedo-tubes.

Dom Carlos I. The Dom Carlos I., of 4100 tons, has been launched at Elswick. In the description of this vessel which was given last year the armament was incorrect. It consists of two 8-in., ten 4·7-in., twelve 6-pdr. and six 1-pdr. Q.-F. guns, and of five torpedo-tubes, of which two are submerged. The coal capacity is 1000 tons, which gives an endurance of 10,000 miles at 12 knots. I.H.P., 14,500; speed, 23 knots.

Adamastor. The third-class cruiser Adamastor (1964 tons), of which some particulars were given in the *Annual* of 1896, has completed her trials. She is protected by a deck 5 in. thick, and her armament includes two 5·9-in. Q.-F. guns forward and aft, four 4·7-in and four 2·2-in. Q.-F. guns on the main deck, two 1-pdrs. on the bridge and two Nordenfelts in the tops. The triple-expansion engines, of 2000 horse-power each, worked most satisfactorily. With natural draught the speed realised was 17·19 knots, the contract speed being 16 knots,

and with forced draught the speed exceeded 18 knots. The vessel was built by Orlando Bros., of Leghorn.

With the funds raised by public subscription a gunboat of 340 tons displacement, 480 horse-power, and 11 knots speed, has been laid down. She will be armed with two 1·8-in. guns in turrets forward and aft, and two machine-guns.

The two small third-class cruisers building at Havre have been named San Gabriel and San Rafael.

Spain.

Spain has made considerable efforts to face the difficulties which may arise in the Caribbean Sea in consequence of the situation in Cuba. New construction and refits have been pressed forward, and the *personnel* of the fleet has been reorganised. The list of officers now comprises 1 admiral, 6 vice-admirals, 15 rear-admirals, 24 senior captains, 47 junior captains, 87 commanders, 117 lieutenants (first-class), 313 second-class lieutenants, 224 sub-lieutenants.

The armoured cruisers Cardinal Cisneros and Cataluña, of 7000 tons displacement, 15,000 I.H.P., and 20 knots speed, have been launched at Ferrol. They are of the same class as the Infanta Maria Teresa, Oquendo, Princessa de Asturias, and Viscaya (which was present at the Naval Review at Spithead), and have already been described in these pages.

The torpedo-gunboats Don Alvaro de Bazan and Marques de la Victoria have been launched. Length, 233 ft.; beam, 26 ft. 9 in.; draught of water aft, 22 ft.; displacement, 823 tons; I.H.P., 4600 with forced draught; speed, 20 knots. The boilers are of the locomotive type. The armament consists of two 4·7-in. Q.-F. guns, four 1·5-in. Nordenfelts, two Hotchkiss guns, and four torpedo-tubes.

The destroyers Osada, Proserpine, and Pluton, of 400 tons displacement and 30 knots speed, have been launched at Messrs. Thomson's yard at Clydebank. The Pluton steamed 30·1 knots on her trials. The Osada and Pluton have left for Spain.

The ships laid down are: at Carraca, the cruiser Isabel la Catholica, of 3000 tons, the cost of which is to be partly defrayed from the subscription raised among the Spanish colonists in Mexico; at Ferrol, the protected cruiser Reina Regente, of 5000 tons and 20 knots speed, to take the place of the ill-fated vessel of the same name which was lost with all hands in 1896; at the Forges et Chantiers de la Mediterranée, the Rio del la Plata, presented by the colonists of South America. This vessel is of 1800 tons displacement, 7100

I.H.P., and 21 knots speed. She will have Normand boilers, and will be armed with two 5·5-in., four 3·9-in., besides smaller Q.-F. guns.

The Carlos V., of 9000 tons displacement, has steamed to Havre to receive her armament.

The battleship Pelayo has been refitted at La Seyne. Her old boilers have been replaced by Niclausse boilers. She has been fitted with an armoured redoubt, and with a medium Q.-F. armament. The old battleships Numancia and Vitoria have been repaired.

Cristobal Colon.

The armoured cruiser Cristobal Colon, of 6840 tons and 14,000 horse-power, built by Messrs. Ansaldo, of Genoa, and bought last year by the Spanish Government, has been through her trials. She has twin screws, and twenty-four boilers of the Niclausse type distributed in six groups in four separate boiler-rooms. With twelve boilers, 4760 horse-power was developed, and the speed was 17·2 knots, the revolutions being 75. On the full-power trial, the speed was 19·6 knots, the consumption of coal being 1·76 lbs. per I.H.P. per hour. The secondary armament of the Cristobal Colon is better protected than that of the Cardinal Cisneros, by 6-in. armour above the belt. She is an excellent addition to the Spanish Navy, and a sister ship, the Pedro d'Arragon, has been ordered from Messrs. Ansaldo.

SWEDEN.

The small battleship Odin, of 3300 tons and 16 knots speed, has completed her trials. She is a sister ship to the Thor and the Njord, whose construction is fairly well advanced. Two small torpedo-gunboats, the Edjern and Jarnan, have been launched. Displacement, 670 tons; I.H.P., 4000; speed, 19 knots; armament, two 4·7-in., four 2·2-in. quick-firing guns, and two torpedo-tubes.

TURKEY.

For the first time for many years a Turkish fleet left the Dardanelles during the Græco-Turkish war, but contented itself with making a harmless demonstration, and did not attempt to meet the Greek fleet. After the victorious campaign in Thessaly, the Sultan, struck by the advantages which might have been derived from the command of the seas, had a programme drawn up for the reconstitution of the fleet. Will this programme share the fate of so many others drawn up by the Turkish Admiralty? For the moment the modernising of the older battleships is the principal subject of discussion.

United States.

It appears that the principal corps of the United States Navy will shortly be reorganised. At present all officers serve for a long period in the junior grades, while those who become superior officers pass very rapidly through the higher ranks; the effect being that the United States naval officer when in full vigour only performs subordinate duties, and does not have the responsibility of command till he is approaching old age. If the executive had had the power, and the authority of Congress had not been necessary, these grievances would have been long since remedied. The plan for reorganising the *personnel*, which has been embodied in a Bill, has been drawn up by a committee, presided over by the Secretary of the Navy. The number of naval officers is to be fixed at 1020, viz., 16 rear-admirals, 70 captains, 112 commanders, 170 lieutenant-commanders, 300 lieutenants, 350 junior lieutenants and ensigns. The naval cadets have to go through four years' instruction in a naval college before being promoted to be ensigns. Every ensign must be capable of taking charge of a watch on deck or in the engine-room, the Americans believing that every naval officer should be both a sailor and an engineer—an opinion which has been advanced in Europe by distinguished officers. In order to secure the proper flow of promotion, 10 captains, 16 commanders, 25 lieutenant-commanders, 35 lieutenants are to be appointed every year, special arrangements being made to ensure vacancies. The corps of engineers would be merged in that of naval officers, the junior officers being appointed at once to deck duties, the senior officers being confined to the engine-room, while those of intermediate rank would choose either the one or the other. *Personnel.*

In order to obviate the difficulties which the Navy has had with the armour manufacturers, the Navy Department at Washington has been considering a proposal to set up a State establishment for the manufacture of armour—a proposal which emanates from young America. All the Navies of Europe are contented with leaving in private hands the manufacture of armour of every description. In France alone the Indret establishment, which belongs to the Navy, makes thin armour, which does not appear to be any better than that made by the private trade.

No important ship has been laid down during the year.

The battleship Iowa, of 10,410 tons displacement and 12,000 horse-power, has completed her trials satisfactorily. The coal supply at load-draught is 625 tons, but can be increased to 1795 tons, which will give an endurance of 7000 miles at 10 knots. A remarkable feature Iowa.

of the Iowa is the length of her funnels (100 ft. from the furnace bars), in order to give a powerful draught without using the fans. The speed realised was 17·87 knots, which gave Messrs. Cramp, the builders, a premium of £75,000, at the rate of £4000 for every tenth of a knot beyond the stipulated speed.

The small twin-screw cruisers Helena, Wilmington, and Nashville have been through their trials. The two first-named are of 1392 tons displacement and 1600 horse-power. The Helena steamed 15·5 knots, the Wilmington 15 knots, the estimated speed being 13 knots. The Nashville, of 1371 tons displacement and 1900 horse-power, steamed 16·3 knots instead of the 14 knots estimated. The gunboats Princeton, 1000 tons and 850 horse-power, Wheeling and Marietta, 1200 tons and 800 horse-power, have been launched and have slightly exceeded the estimated speed of 12 knots. These ships are destined for the navigation of the large rivers. The Vicksburg, Newport, and the Annapolis (sister ships of the Princeton), launched last year, have given similar results.

Destroyers

Three destroyers of 265 tons displacement, 5600 horse-power, and 33 knots trial speed, have been laid down, the Bailey at New York, the Stringham at Wilmington, and the Goldsborough at Seattle. The torpedo-boat Dupont steamed 31·7 knots, but at the end of the trial the piston became heated, rendering one of the engines useless.

Submarine boats.

The Americans have gone in eagerly for the construction of submarine boats. The Holland, which was launched this year, is 53 ft. 2 in. long and has an extreme beam of 10 ft. 2 in. She is to steam 10 knots on the surface and 8 knots under the water. According to the contract, she is to pass from the floating to the submerged condition, and *vice versâ*, in a minute. Her armament consists of a gun aft firing a shell charged with 180 lbs. explosive; another forward, firing a 400-lb. projectile charged with 100 lbs. explosive; and a Whitehead torpedo. The trials of the boat have begun, but have not been satisfactory. The Americans, in attempting to solve at one blow all the problems involved in a submarine torpedo-boat, have accumulated too many difficulties. Another boat constructed at Baltimore on Mr. Holland's plans, called the Plunger, 85 ft. long, 11 ft. 6 in. broad, with a displacement of 135 tons when on the surface, was launched on August 20th. There are two quadruple-expansion engines, with water-tube boilers for surface navigation. For underwater navigation, an electric motor, fed by accumulators, will be employed. The armament consists of two torpedo-tubes.

Although it is not yet known what programme of construction the Congress will authorise, the following information will be of

interest on the type of battleship which have been prepared by the Washington Naval Construction Office, and which the Admiralty hopes to put on the stocks this year. The object is to create a fleet specially suited to the navigation of West Indian waters and the Gulf of Mexico, and the Naval Board has recommended that no more ships of great draught be constructed. The proposed battleships will consequently have the following dimensions: length, 372 ft.; beam, 73 ft.; mean draught, 24 ft.; displacement, 11,500 tons. They will have twin screws and engines of 10,000 horse-power. The most powerful guns will be 13-in.; the secondary armament will consist of a large number of quick-firing guns; the turrets will be worked by electricity. The plans of these battleships are ready, and only the authorisation of Congress is wanted to commence building.

Experience of Atlantic squadron in a gale.

The three battleships Oregon, Indiana, and Massachusetts have been fitted with bilge keels—none too soon, as the following account from the *Illustrated American* of the experience of the ships of the Atlantic Squadron in a heavy gale on the passage from Hampton Roads to Charleston will show: "The New York and Columbia stood the test well. The monitor Amphitrite could not keep on her course. Her low freeboard and decks all awash made her comparatively safe as long as she was allowed to steam head on, but in the cross-seas the waves that came aboard jammed upon her superstructure, smothering her down and making speed impossible. While those on board the flagship were anxiously watching the Amphitrite, their attention was diverted to the battleship Indiana. Her accident of last autumn had caused her to be regarded with suspicion. Now she was seen to be rolling frightfully. It was plain that her centre of gravity was uncomfortably high. At length she signalled her turrets loose and her guns moving. There was danger that she might 'turn turtle' and go down with all on board. The admiral signalled her to return to Hampton Roads. The Indiana has too much superstructure, and carries metal too heavy for her design. In her present state she is a fair-weather ship, powerful and efficient indeed in smooth water, but liable to fail the nation in an emergency because of her weakness in a sea way.

"The cruiser Columbia stood the test with credit. With her high freeboard, and the old-fashioned 'tumble-home' of her sides, she swung easily and buoyantly to the vast rollers, and shipped few seas. The duty required of her was to go in search of the Amphitrite, and this duty she successfully carried out. The Maine proved fairly efficient. She steamed well in the cross-seas and kept up speed easily; but the weight of her superstructure and the lines of her sides caused her to ship seas badly, and made her dangerous to her

crew. She could not safely or effectively fight her guns in a heavy sea way, but it is probable that a slight reduction in her metal would remedy this defect and make her in all respects splendidly efficient.

"The Marblehead, meanwhile, has been forced to acknowledge herself unequal to the test. Her rolling was almost as bad as that of the Indiana. On Friday morning she got out her sea anchors and rode head on to the storm. Pitching was more to her taste than rolling. During the struggle seven of her crew were injured and one killed outright. He was dashed against a search light and his back broken. The New York was forced to lie by her for two days.

"It is gratifying to be able to say that the New York stood the test at every point. She proved herself as buoyant as a merchantman; she behaved well both in the cross-seas and head on. The storm did not seriously impede her, and she was ready throughout for any service that could have been required of her."

The armoured cruiser Maine, of 6682 tons displacement and 9300 horse-power, sank in Havana harbour at midnight of the 15th February after an explosion which wrecked the forward part of the vessel. Two hundred and fifty-three men and two officers were killed or drowned. The Maine was launched in November, 1890.

The Argentine Republic.

The Santa Fé, one of the four destroyers constructed by Messrs. Yarrow, of which we spoke last year, has been wrecked on the Colonia Reef. Her armament and some of her fittings were saved.

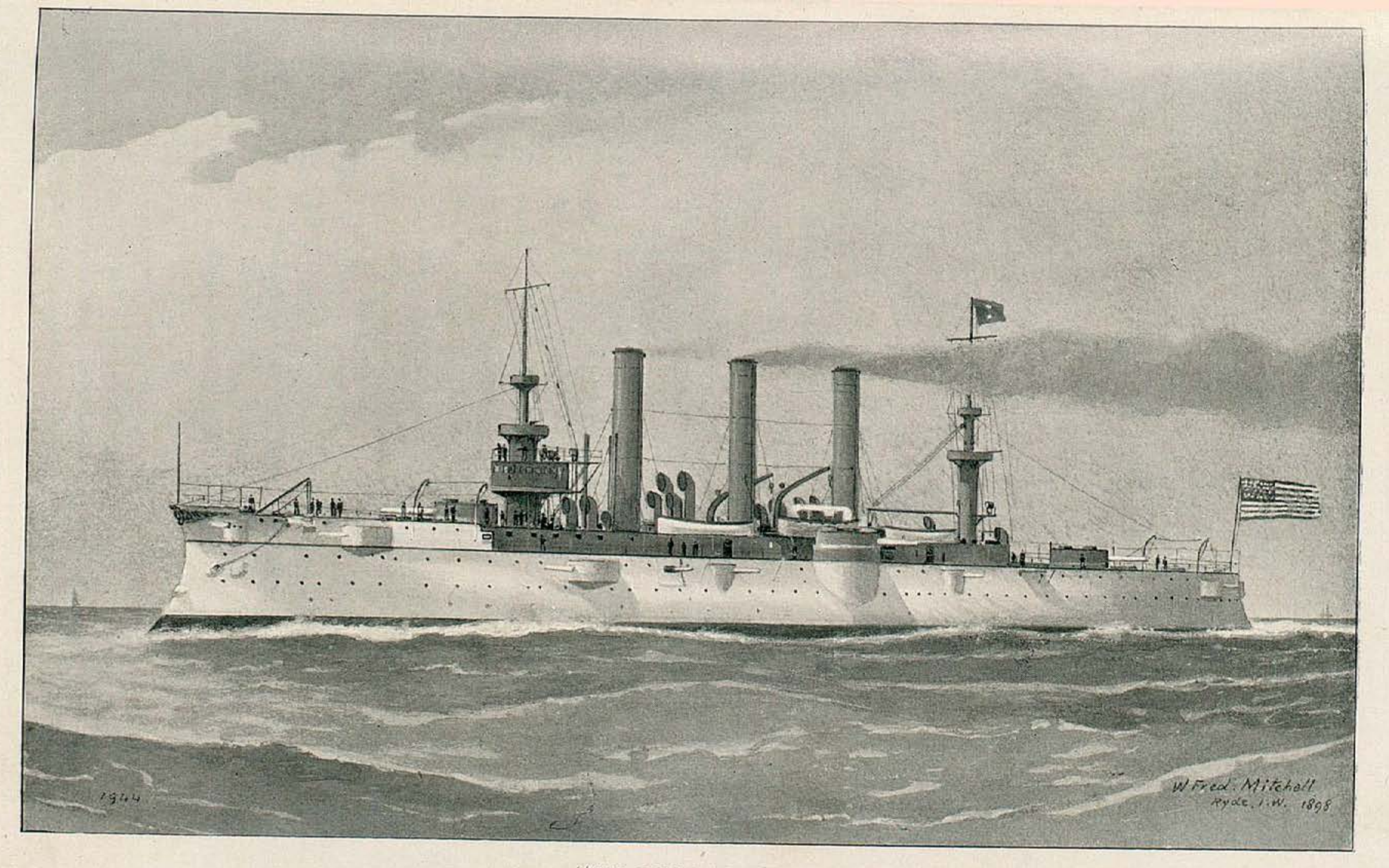
The training-ship President Sarmiento, launched at Messrs. Laird's, Birkenhead, is a vessel of 2780 tons displacement, 13 knots speed, and armed with five 4·7-in. Armstrong guns, twelve small guns and two torpedo-tubes.

The armoured cruiser General San Martino (*ex*-Varese), built at Orlando's Yard, at Leghorn, is about to undergo her trials. She is sister ship to the Garibaldi, a type which has often been described in these pages.

Brazil.

The three torpedo-gunboats, Caramuru, Timbira, and Tupy, constructed at the Germania Yard, at Kiel, have been delivered to the Brazilian Government. Displacement, 1030 tons; 6000 horse-power; speed, 22 knots.

Deodoro. The coast-defence ship Marshal Deodoro, of 3162 tons, described last year, is to be launched shortly at La Seyne.



"BROOKLYN,"

UNITED STATES ARMOURED CRUISER.

Two monitors, the Para and the Maranhao, are building at Rio de Janeiro. Length, 140 ft. 5 in.; beam, 34 ft. 9 in.; displacement, 475 tons; 880 horse-power; speed, 11 knots.

The protected cruiser Barroso, of 3600 tons displacement, built at Elswick, steamed 19·8 knots on the natural draught trial, and 20·5 knots on the full-power trial. Her sister-ships the Amazonas and Almirante Abreu have been sold to the United States.

Chili.

O'Higgins.

The armoured cruiser, or battleship, Almirante O'Higgins, named after the founder of the Chilian Navy, was launched at Elswick on the 17th May, 1897. Displacement, 8500 tons. Two engines of 16,500 I.H.P. are to give a speed of over 21 knots with natural draught. The armament will consist of four 8-in. Q.-F. guns, three firing direct ahead and one astern, and all mounted in barbettes of 6-in. armour and with gun-houses of the same thickness; ten 6-in. Q.-F. guns, six of which will be placed in armoured casemates; four 4·7-in.; ten 12-pr., and ten 6-pr. Q.-F. guns; four Maxims and three torpedo-tubes (two submerged forward and one above water aft). The O'Higgins has a belt of Harveyed steel armour extending over a length of about 260 ft. It is 7 in. thick and 7 ft. wide. She is sheathed with wood and coppered, and has a protective steel deck varying from 2 in. to 1½ in. in thickness. The armour on the conning-tower is 9 in. thick. With bunkers full the O'Higgins will carry 1200 tons of coal. A plate of this ship will be found in Part II.

A training-vessel, of 2400 tons and 12 knots, is in hand in England. Armament, four 4·7-in. and six small guns.

Japan.

Ship-building programme.

The shipbuilding programme has been modified by the substitution of six first-class cruisers of about 9600 tons for four of 7500 tons. There are to be two periods of expansion, as we said last year; the second ending in 1906. The following is the full programme:—four battleships, each 14,850 tons; six first-class cruisers; three second-class cruisers, each 4760 tons; two third-class cruisers, each 3200 tons; three torpedo-gunboats, each 1200 tons; one torpedo depôt-ship, 6750 tons; eleven torpedo-destroyers; eighty-nine torpedo-boats. The total expenditure for carrying out this programme is stated to be £21,200,000 The year of greatest expenditure is the present —£6,000,000; the demands will then rapidly fall to £1,580,000 in 1901–2, and end with £7200 in 1905–6.

Battleships.

To deal with the programme in detail. Of the battleships the Shikishima is making good progress at the Thames Ironworks, the Asaki is building at Elswick, and a third ship of the same type at Clydebank.

First-class cruisers.

Three first-class cruisers of 9750 tons, two of which are to be named the Asama and Tokiwa, are being built by Messrs. Armstrong, Whitworth & Co. A fourth, the Yakumo, is being built at the Vulcan Yard, Stettin. A fifth, the Azuma, is to be constructed at the Chantiers de la Loire. The dimensions of the Elswick cruisers are as follows: length, 408 ft.; beam, 67 ft.; draught, 24 ft. 3 in. The dimensions of the Azuma are: length, 445 ft. 10 in.; beam, 59 ft. 6 in.; load draught, 28 ft.; displacement, 9436 tons. Twin screws, driven by two vertical triple-expansion engines of 17,000 horse-power, will give a speed of 20 knots. The hull is protected by a water-line belt 6 in. in thickness; above the belt, the length of the casemate, there is thinner armour. An armoured deck extends throughout the whole length, sloping to 3 ft. 8 in. below the water-line. The armament comprises four 8-in. guns, mounted in pairs in armoured turrets forward and aft; eight 6-in. Q.-F. guns in armoured casemates isolated by thick screens; four 6-in. Q.-F. guns on the upper deck protected by shields; twelve 3-in. and twelve 1·8-in. Q.-F. guns on the upper deck and in the tops. There are five torpedo-tubes, of which four are submerged; the ammunition hoists are in armoured tubes. The ships will have two masts and be square-rigged.

Second-class cruisers.

Of the second-class cruisers, the Kasagi and Chitose have been launched at Philadelphia and San Francisco. Some description of these ships was given last year. They are improved Yoshinos, of 4760 tons, with normal coal supply of 350 tons, though 1000 tons can be stowed on board. There will be two 8-in. quick-firers, forward and aft, discharging four rounds in sixty-four seconds, protected by shields, and having firing arcs of 270 degrees, and ten 4·7-in. quick-firers on the main deck, the broadside pieces with firing arcs of 100 degrees, while the two forward and two aft will have arcs of 130 degrees. All these guns are on armoured sponsons and protected by shields. There will be five torpedo-tubes.

The cruiser Takasago, of 4300 tons, has been launched at Elswick. The estimated speed is 24 knots with 15,500 I.H.P. The vessel is protected by an armoured deck, extending from stem to stern, 2 in. to 4·5 in. thick.

The destroyers ordered from Messrs. Thornycroft are of 275 tons displacement, 5000 horse-power, and 30 knots speed; they are armed with six small guns and two torpedo-tubes. The four

Yarrow destroyers are of 260 tons displacement, 6000 horse-power, and 31 knots speed, and will be very like the destroyers built by the same firm for the Argentine Republic. The five Schichau and five Normand torpedo-boats displace about 82 tons, and are to steam 25 knots.

The battleships Yashima, built by Messrs. Sir W. G. Armstrong, Whitworth & Co., and Fuji, built at the Thames Ironworks, were described in the *Naval Annual* of 1896. The particulars of their trials are extracted from the *Times*. "The Yashima under forced draught maintained a speed of 19·5 knots for some time, the mean speed for the whole four hours being 19·227 knots, with 1½-in. air-pressure and rather over 14,000 horse-power. On the trial of six hours' duration a power of nearly 10,000 horses was developed—mean speed, 17·26 knots; but the mean of four runs over the Admiralty measured mile during the early part of the trial gave a speed of 17·76 knots. The mean speed obtained with forced draught was nearly a knot in excess of that guaranteed by the contract. The machinery gave no trouble whatever, and the ship was practically free from vibration. At the end of the natural draught trials, while the vessel was at full speed, turning trials were made with helm at various angles. It was found that the battleship could turn in a circle of 180 yards in diameter, or less than one and-a-half times her own length; this was with the rudder hard over and both engines going ahead. The circle is the smallest ever made by a vessel of this size, and is the result of having a large balanced rudder carried low down beneath the stern, the deadwood of which is very much cut away—a form which has been adopted recently in all the Elswick cruisers with such good results that it was determined to try it in the Yashima. **Yashima.**

"The Fuji in the six hours' natural draught trial attained a speed of 16·8 knots with 10,200 H.P. On the four hours' full power trial the mean result of six runs gave a speed of 18·5 knots, with 14,000 H.P., 120 revolutions, and 1½-in. air pressure. The propelling machinery of both ships is by Messrs. Humphrys, Tennant & Co., and is of the three-cylinder vertical triple-expansion type." The Yashima and Fuji are now in Japanese waters. **Fuji.**

The great effort which Japan is making will give her in a few years a fine fleet. She can already muster a fleet that will bear comparison with any of those which the Western nations maintain in Eastern waters, notwithstanding the reinforcements despatched thither. Japan has been developing her mercantile marine at the same time as her Navy. Several fine steamers have been built in England, the best of which are fitted to receive an armament and to serve as

auxiliary cruisers. Being an island kingdom, Japan dreams of playing the same part in the East as England has done in Europe.

The old battleship Fuso, of 3718 tons, 13 knots speed, has been wrecked on a reef near Uagahama.

CHINA.

It has been stated repeatedly that the Celestial Empire is about to undertake the reorganisation of its Navy, and that a shipbuilding programme has been adopted. It has been proposed to create and equip three dockyards—one in the Bay of Kiao-Chao, one at Nam-Kivan, and the third at Mirs Bay, near Hong-Kong; but the treasury is empty, and the Imperial Government has heavy debts to pay, on the one hand to Japan—to free herself of the war indemnity—and to her creditors on the other. The Germans have taken possession of the Bay of Kiao-Chao, thus bringing the Chinese plans for an arsenal at that place to naught. Several ships which will go to form the nucleus of an Imperial Fleet are, however, ready for sea.

The protected cruisers Hai Tien and Hai-Chi have been launched from the Elswick shipyard of Sir W. G. Armstrong, Whitworth & Co. Their principal dimensions are as follows: length, 396 ft.; breadth, 46 ft 8 in.; mean draught, 16 ft. 9 in.; displacement, 4300 tons. These vessels will have a strong protective deck, 5 in. in thickness on the sloping parts, and 1½ in. on the horizontal; extending from one extremity to the other, so as to completely protect the machinery, magazines, and steering gear. The conning-tower is of steel 6 in. in thickness. The speed guaranteed is 24 knots on a trial of four hours duration. The coal capacity is about 1000 tons. Armament: two 8-in. Elswick Q.-F. guns, ten 4·7-in. Q.-F. guns, twelve 3-pdrs., four 1·4-in. Maxims, six rifle calibre Maxims, and five 18-in. torpedo-tubes. The armament of these cruisers compares favourably with that of many cruisers of much larger displacement. The speed is intended to be greater than has been attained before by any cruisers. The coal endurance is 12,000 miles.

Three protected cruisers, the Hai Yung, Hai Skew * and Hai Shen have been launched at the Vulcan Yard (Stettin). Length, 328 ft.; beam, 41 ft.; extreme draught, 16 ft. 6 in.; displacement, 2950 tons. Protection is given by a steel deck varying in thickness between 1½ in. and 3 in. The guns are protected by steel shields. Engines of 7500 horse-power driving two screws are to give a speed

* Name uncertain.—Ed.

of 19·5 knots. The normal coal supply will be 220 tons, and the complement 290 officers and men. The armament consists of three 5·9-in. and eight 4-in. Krupp Q.-F. guns, six 1·4-in. Hotchkiss Q.-F., six Maxims, and three above-water torpedo-tubes.

Since the peace of Simoneski the torpedo-gunboats Feiying, of 850 tons, 5500 horse-power, and 22 knots, and the Feiting, of 1000 tons and 2400 horse-power, have been delivered for the Peiyang Squadron.* For the Nan Yong Squadron, Schichau has delivered two 128-ft. torpedo-boats of 24 knots speed, and the Vulcan Yard two of 138 ft. length and 24 knots. Schichau has in hand four destroyers, 193 ft. 6 in. long and of 32 knots speed, for the same squadron.

A French naval architect has taken charge of the Foochow arsenal.

E. WEYL.

* This information is very doubtful.—ED.

CHAPTER III.

Relative Strength.

As already mentioned in an earlier chapter, the imposing display of Naval strength at the Naval Review has incited other countries to fresh efforts. A new programme of shipbuilding has been drawn up in France by the Minister of Marine, approved by the Budget Committee and passed by the Chamber. In Germany a Bill has been introduced very much on the lines of our Naval Defence Act. The Naval resources of Russia are growing, and a special grant of £9,000,000 outside the Navy Estimates has just been allotted to new construction. In the United States there is no indication of any weakening in the determination, which was noticed last year, to take rank amongst the Naval Powers of the world. The reception of Mr. Cannon's proposal for a special appropriation of £10,000,000 is a recent evidence of this feeling. The one country with which we have no cause of difference, Italy, has been hampered for some years by financial difficulties, and her Navy has stood still while others have gone forward. Japan is already becoming a Naval Power to be reckoned with.

Ships in commission.

Dealing first with ships in commission, the principal change, as far as our own fleets are concerned, has been the gradual substitution of newer and more powerful vessels for the older ships in our principal squadrons in European waters. Three Majestics have been added to the Channel Squadron in place of two Royal Sovereigns transferred to the Mediterranean. The Nile and Trafalgar, the ships relieved by the Royal Sovereign and Empress of India, have taken the place of the Devastation and Inflexible as Port-guard ships. The Cæsar has recently taken the place of the Victorious in the Channel Squadron. The great feature of our two principal fleets is their homogeneity. Of the first-class battleships in the British Mediterranean Fleet six are of the same class. The two types represented in the Channel Fleet are so nearly similar that it may be fairly described as a homogeneous squadron.

Mediterranean.

In spite of the fact that we have just at the moment only eight battleships in commission in the Mediterranean as compared with ten last year, our comparative position is no worse, partly owing to the substitution of newer for older ships, and partly owing to the

	GREAT BRITAIN.			FRANCE.			RUSSIA.
CLASS.	MEDITERRANEAN FLEET.	CHANNEL FLEET.	RESERVE SQUADRON of Coast and Port Guard Ships.	MEDITERRANEAN FLEET. Permanent Squadron	MEDITERRANEAN FLEET. Reserve Division ‡	NORTHERN SQUADRON.	MEDITERRANEAN.
BATTLESHIPS	*Anson* * Camperdown Empress of India Hood Ramillies Revenge Royal Oak Royal Sovereign Hannibal † Illustrious †	Cæsar Majestic Magnificent Jupiter Mars Prince George Repulse Resolution	Alexandra (C.G.) Benbow (C.G.) Collingwood (C.G.) Colossus (C.G.) Nile (P.G.) Rodney (C.G.) Thunderer (P.G.) Trafalgar (P.G.) Sans Pareil (P.G.) Howe (P.G.) Conqueror } *Tenders* Hero }	Brennus Carnot Charles Martel Jauréguiberry Marceau Neptune Courbet Formidable	Amiral Duperré Dévastation Indomptable	Hoche ** Bouvines Amiral Tréhouart Jemmapes Valmy	Nicolas I. Alexander II.
COAST-DEFENCE SHIPS	Rupert (Gibraltar) Orion (Malta)	..	..	..	Achéron (Toulon) Tempête (Bizerta)	..	Grosjastchy
CRUISERS, 1st-Class	Gibraltar Hawke	Blake Blenheim	Australia Galatea	Amiral Charner Latouche-Tréville	Chanzy	Dupuy de Lôme Pothuau	
CRUISERS, 2nd-Class	Venus Astræa Forte Scylla Thetis	Arrogant Charybdis	Melampus Mersey	Bugeaud	..	Friant	
SMALLER CRUISERS	Fearless Scout Surprise	Pelorus	..	Galilée, Lalande Cosmao	Milan	Surcouf	Uraletz
TORPEDO-GUNBOATS	Dryad, Harrier Hazard, Hebe Hussar *Torpedo Ram* Polyphemus	Halcyon Speedy	*Tenders* Alarm, Circe Gossamer, Leda Niger, Onyx Renard, Spanker	Faucon, Vautour Wattignies D'Iberville Lévrier Bombe (Constantinople)	Légor Dague (Algeria) Condor (Tunis)	Cassini Epervier St. Barbe (Dunkirk)	Posadnik
DESTROYERS	5	..	..	5	2	..	

* Ordered home. † Will be in commission by May. ‡ *Cf.* Chap. II. p. 21. ** To be replaced by Masséna.

fact that the French have now in commission only eight battleships in their Permanent and three in the Reserve Squadron, or, as it has now become, the "Reserve Division," as compared with ten and five ships respectively last year. Two second-class battleships are included in the French Squadrons. The Russians had until lately a squadron of four battleships and one coast-defence ship in commission in the Mediterranean, three of the former being of the second class. The Navarin and the Sissoi Veliky have been despatched to China, so also have the Victorious and Barfleur. The Hannibal and Illustrious will probably be ready for sea by May, the Anson being ordered home. There is no reason to suppose that the British Mediterranean Fleet is not capable of holding its own against a combination of the Russian and French Permanent Squadron. Reinforce the British Fleet by its proper reserve, the Channel Squadron, and the Russo-French combination by the French Reserve Division, and we have an overwhelming superiority. Supposing we were to include the five Russian battleships in the Black Sea in the combination which we might possibly have to meet in the Mediterranean, we should be able to oppose a fleet of seventeen first-class battleships, consisting mainly of two types (viz., eight Majestics and eight Royal Sovereigns), to eighteen battleships of the most varied types and fighting efficiency.

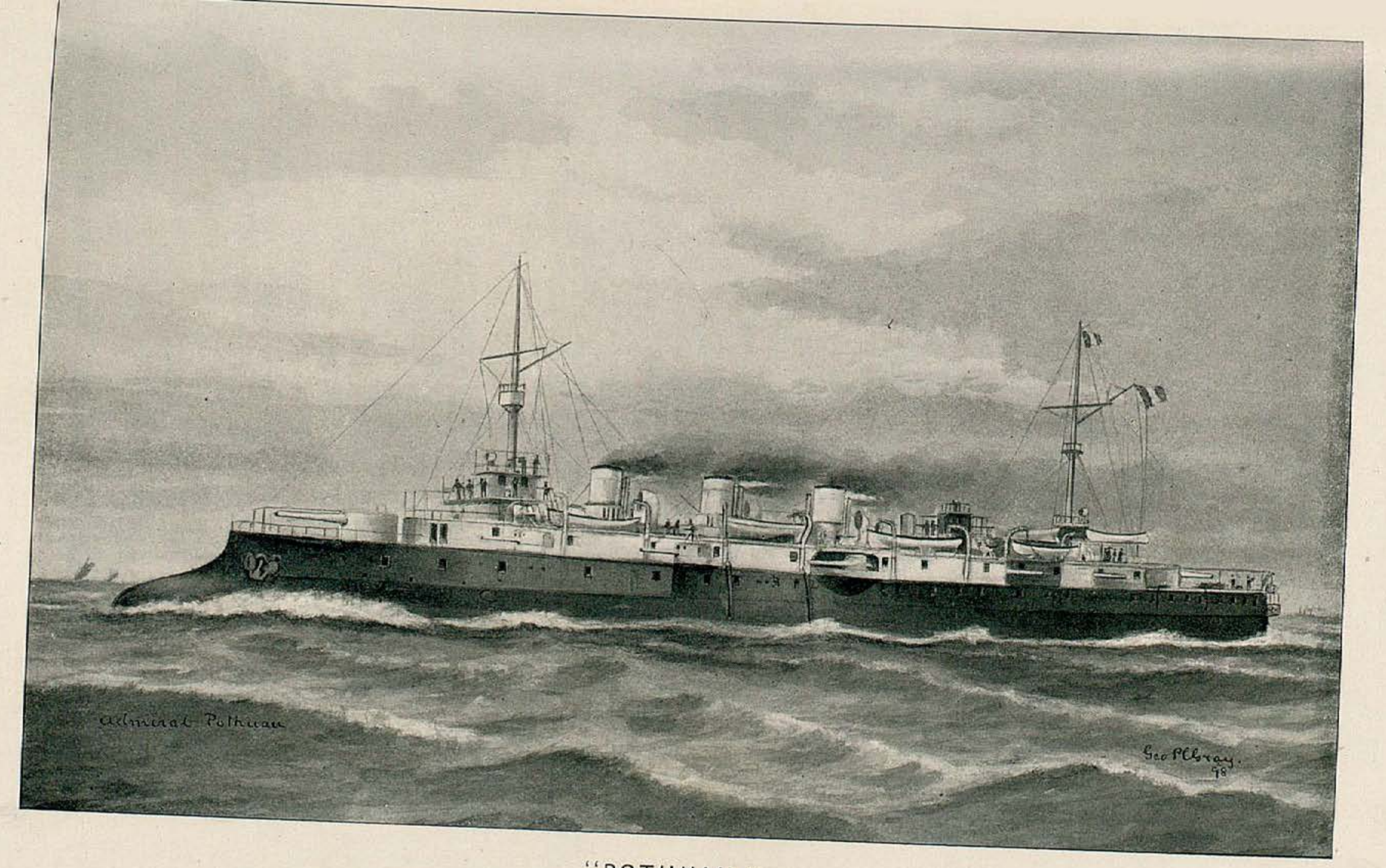
Channel Squadron.

The British Channel Squadron now consists of eight first-class battleships—one more than last year—and is by far the most powerful squadron in the world. It includes six Majestics and two Royal Sovereigns. The latter may be transferred to the Mediterranean on the completion of the Hannibal and Illustrious. To the French Northern Squadron the armoured cruiser Pothuau, which was at Spithead for the Jubilee Review, has been added. The British Reserve Squadron has been increased greatly in strength. It now includes seven first-class and three second-class battleships, instead of three first-class and five second-class battleships as last year. The Russians have no ships in commission in the Baltic during the winter months, and no ships available for commission except the Peter Veliky. All the effective ships of the Baltic Squadron are in the Mediterranean or in China.

Battleships in commission.

To sum up, we have in commission or partial commission in European waters twenty-four first-class battleships, three second-class, and two third-class *; the French eleven of the first-class and five of the second-class (including the Jemmapes and Valmy); the Russians five of the first-class, four of the second-class, and one of the third-class in the summer months. We have one battleship

* *Cf.* p. 57.



"POTHUAU,"

FRENCH ARMOURED CRUISER.

in commission in North America, three in China, another at the Cape. The French have one and the Russians two battleships in China. Including these the figures stand as follows:—

BATTLESHIPS IN COMMISSION.

	Britain.	France.	Russia.	Germany.
First-class	28	11	5	4
Second-class	3	5	4	2
Third-class	3	1	1	2
	34	17	10	8

It has been the policy of the Admiralty for some time past to keep all our newest and most powerful ships in commission. In reserve (for the most part in the B division) we have only the second-class battleships Devastation, Edinburgh, and Inflexible, the third-class battleships Hercules, Neptune, Superb, Sultan, Téméraire, Bellerophon, Triumph, Swiftsure, and three of the Audacious class. The four vessels of the Achilles class, the Nelson and Northampton, can hardly be taken into consideration, while the Dreadnought is going through an extensive refit. The French have available only the Magenta, the second-class battleship Friedland, the third-class battleships Colbert, Richelieu, Trident, Duguesclin, and Turenne. The Amiral Baudin, Redoutable, and three of the Caïman class are being rearmed and refitted.* Russia has no completed ships of much fighting value in reserve. The three ships of the Poltava class should, however, be ready in the summer. Reserves.

On stations outside the limits of European waters there have been numerous changes during the year. Owing to the disturbed situation in China there have been considerable additions to the European fleets in those waters. The British Fleet has been strengthened by the battleships Victorious and Barfleur and two first-class cruisers, that of the Russians by the Navarin and Sissoi Veliky. The Rossia arrived in China shortly before the Powerful. To the French Squadron has been added two second-class cruisers, one the Duguay-Trouin, detached from the Pacific station. The German Squadron which was despatched from Kiel in the autumn, under Imperial auspices, with the ships already on the station, is not, perhaps, a very formidable force in itself, but would be of some weight in the balance. Until the dispatch of the Victorious the Russian Squadron was nearly equal in force to the British squadron. The position would have been extremely critical if we had become involved without allies in hostilities with two of the powers having interests in China, Russia being one. We can hardly hope to be able to maintain a force in commission capable of dealing with every China station.

* *Cf.* p. 29.

possible rival in every possible quarter of the world. We have the same interest as Japan in resisting German and Russian aggression in China. An understanding with Japan to act together in case of trouble is from many points of view desirable.

SHIPS IN COMMISSION.

CHINA.

CLASS.	BRITISH.	FRENCH.	RUSSIAN.	GERMAN.
BATTLESHIPS .	Victorious* Centurion Barfleur*	Bayard ..	Navarin Sissoi Veliky	Deutschland Kaiser
1st-Cl. CRUISERS	Immortalité Narcissus Undaunted Powerful Grafton	.. ..	Rossia Rurik Pamyat Azova Dimitri Donskoi Admiral Nahimoff ‡ Vladimir Monomach	Kaiserin Augusta
2nd-Cl. CRS. .	Bonaventure Iphigenia Piquet†	Jean Bart Pascal Descartes Duguay-Trouin	Admiral Korniloff	Irene Gefion Prinzess Wilhelm
3rd-Cl. CRS. .	Archer Alacrity	Eclaireur	..	Arcona
SLOOPS, etc. .	9	3	5	1
TOR.-GUNBOATS	..	..	2	
ARM.-GUNBOATS	..	Styx (Cochin China)	Gremiastchy Otvajny	
DESTROYERS .	4			

* Lent from Mediterranean. † To be relieved by Hermione.
‡ To be relieved by Rasboinik.

EAST INDIES.

CLASS.	BRITISH.	FRENCH.
2nd-Cl. CRUISER . . .	Eclipse	
3rd-Cl. CRUISERS . . .	Racoon Cossack Melpomene	La Pérouse Fabert
SLOOPS and GUNBOATS . .	4	
TORPEDO-GUNBOATS . .	2 (1 in reserve)	
COAST-DEFENCE SHIPS . .	Magdala Abyssinia (in reserve)	

ATLANTIC.

Class.	British.		French.
	Cape.	America.	
Battleship . . .	*In reserve (Capetown)* Monarch	Renown	
Coast-Defence Ship	Penelope *	*In reserve (Bermuda)* Hotspur	
2nd-Cl. Cruisers .	Doris Fox	Talbot Indefatigable Intrepid Flora	Dubourdieu
3rd-Cl. Cruisers .	Magicienne Barracouta Blonde Barrosa Phœbe	Pallas Pearl Cordelia	Rigault de Genou-[illy
Sloops and 1st-Cl. Gunboats . .	4	6	1
Destroyers . .		1	

* Now used as receiving ship.

PACIFIC.

Class.	British.		French.
	Australian Station.	Pacific Station.	
1st-Cl. Cruiser .	Royal Arthur	Impérieuse	
2nd-Cl. Cruisers .	..	Leander Phaeton Amphion	Duguay-Trouin*
3rd-Cl. Cruisers .	Katoomba Mildura Ringarooma } *In reserve* Tauranga } *(Sydney)* Wallaroo Mohawk Porpoise Royalist		
Coast-Defence Ship	Cerberus †		
Sloops and Gunboats	3	2	1
Torpedo-Gunboats	2 (1 in reserve)		
Destroyers	..	1	

* The Duguay-Trouin has been sent to China. † Victorian Marine.

Other stations.

In the East Indies the Eclipse has relieved the Bonaventure as flagship. On the North America station the battleship Renown has taken the place of the Crescent, and the coast-defence ship Hotspur has been sent to Bermuda. The Doris has relieved the St. George at the Cape as being more suitable for work in shallow waters. Our squadron on the Pacific station has been much improved by the substitution of three of the Amphion class for the Comus, the Satellite, and a sloop. The composition of the Australian Squadron leaves much to be desired. The Royal Arthur has relieved the Orlando, but the substitution of the Porpoise and Mohawk for the Pylades and Rapid is of little advantage. The Katoomba and her four sisters are efficient ships for work on most of the station, but they are not big enough for contending with the heavy gales on the southern coast of Australia. The Mohawk and Porpoise are still less fitted for this work. Two cruisers would have to be stationed in war time, with Albany as their base, to protect the trade converging from Europe on Cape Leeuwin. The Australian Squadron would be improved if two cruisers of the Eclipse class were substituted for four of the smaller vessels.

Comparative tables.

The table on the next page is a summary of the lists printed at the end of the chapter and gives the effective fighting ships completed and under construction for the principal Navies. The first-class battleships in subdivision B will probably drop into the second-class next year. In these lists the second and third-class cruisers are distinguished for the first time. The list of "look-out ships" disappears, some being classified with first-class cruisers, others, such as the French "croiseurs torpilleurs," with the torpedo-gunboats. All ships have been arranged in types instead of in alphabetical order.

Cruisers v. Battleships.

Is the command of the sea passing from the battleship to the fast, powerfully-armed and well-protected cruisers, of which so many are being constructed both for our own and foreign Navies? For our part, we believe that the command of the sea cannot be secured by the ship, any more than by the fleet, through *evasion*. The modern armoured cruiser may be more powerful than many of the older battleships—the distinction between the cruiser and the battleship of to-day is doubtless becoming less and less marked; but unless the modern cruiser is prepared to fight the modern battleship it can hardly be admitted that she will succeed in securing the command of the sea. The relative strength of Navies must continue to be estimated largely by their relative strength in battleships.

EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	Britain.			France.			Russia.			Italy.			Germany.			United States.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships—																		
1st-Class	29	9	38	14	6	20	6	6	12	8	2	10	4	3	7	4	5	9
2nd-Class	7	..	7	8	1	9	4	1	5	2	..	2	4	..	4	1	..	1
3rd-Class	18	..	18	7	..	7	5	..	5	3	..	3	6	..	6	..	..	..
Total Battleships	54	9	63	29	7	36	15	7	22	13	2	15	14	3	17	5	5	10
Coast-Defence Ships	14	..	14	16	..	16	13	1	14	..	..	..	18	1	19	19	..	19
Cruisers—																		
1st-Class	23	11	34	8	14	22	6	4	10	..	4	4	1	1	2	5	..	5
2nd-Class	47	6	53	13	2	15	3	..	3	5	..	5	3	5	8	6	..	6
3rd-Class	34	10	44	9	3	12	1	..	1	9	1	10	9	1	10	10	..	10
Total Cruisers	104	27	131	30	19	49	10	4	14	14	5	19	13	7	20	21	..	21
Torpedo-Gunboats	34	..	34	19	2	21	8	1	9	15	2	17	4	..	4	..	..	..

Battle-ships.

In first-class battleships our position this year is more satisfactory than it has been for a long time past, or than it is likely to be for many years to come. Reckoning the Hannibal, Illustrious and Massina (the completion of which will probably be delayed owing to a recent unsatisfactory trial) as ready for sea, we have twenty-nine battleships completed as against twenty for France and Russia and twenty-four if Germany is included in the combination. We estimated last year that France and Russia would have twenty-four first-class battleships completed at the end of 1897. The Petropavlosk has been through her trials, and should be ready for sea in the summer.

Of second-class battleships we have seven, France has eight, Russia four, and Germany four, or a total of sixteen. Two of the French and two of the Russian ships are faster than anything we have in this class. In each country there is one ship on the stocks. The third Sissoi Veliky appears to be a myth, as other Russian ships have proved before. Until our first-class B battleships drop into the second-class, our position in the second-class will not compare favourably with that of our rivals. The Nelson, Northampton, Shannon, Suffren, and Victorieuse have been struck out of the list of effective third-class ships.

Battle-ships building.

In the comparative tables at the end of the chapter the battle-ships under construction are printed in italics. A reference to these will show that we have nine battleships building to six building for France, seven for Russia, and three for Germany, or nine to sixteen. It is proposed to lay down before the close of the next financial year three battleships in England, one in France, and two in Germany. We are laying down barely sufficient battleships to hold our own against France and Russia. If Germany be included in the comparison, we shall have at the end of 1898 twelve battleships building as against eighteen building for France, Russia, and Germany. It is clear that no relaxation in our battleship construction is possible.

Need for numbers.

In Chapter I. the question of numbers and dimensions has been alluded to. No battleships building for foreign Navies, except the Shikishima and her sister ships, exceed 13,000 tons in displacement. The British battleships now being laid down displace 15,000 tons. As we have already a preponderance in ships of great individual size and power, we must again urge, as we did last year, that attention should be devoted to securing in the future the preponderance in numbers which we are in danger of losing. For operations in the waters of Northern Europe or for Home Defence vessels of the

sea-keeping qualities of the Majestic, the Formidable, or the Canopus are unnecessary. For these purposes we need a ship with as powerful an armament and as good protection as our present first-class battleships, and with a speed of not less than 17½ knots. By accepting some reduction in sea-keeping qualities (coal supply, freeboard, etc.) these qualities could be secured on a moderate displacement.

Comparative Tables of British, French, Russian, Italian, and German Ships.

NOTE.—*Displacements of Foreign Ships are converted into English tons.*

TABLE I.—FIRST-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.			ITALY.			GERMANY.		
Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.
	B	Tons.		B	Tons.		B	Tons.		B	Tons.		A	Tons.
1886	Anson	10,600	1883	Baudin	11,723	1892	Georgi Pobiedonosetz	10,280	1880	Italia	14,160	1891	Brandenburg ..	9,874
1885	Benbow	10,600	1879	Duperré	11,032	1891	Navarin	10,206	1883	Lepanto	14,173	1891	Kurfürst Fried. Wilhelm ..	
1885	Camperdown ..	10,600	1881	Courbet	10,637	1886	Catherine II. ..	10,181	1885	Andrea Doria ..	10,826	1891	Weissenburg ..	
1882	Collingwood ..	9,500	1879	Dévastation ..	10,535	1887	Sinope		1884	Lauria		1892	Wörth	
1885	Howe	10,300	1885	Formidable ..	11,972	1886	Tchesmé		1885	Morosini		1896	*Kaiser Friedrich III.*	10,933
1884	Rodney	10,300	1886	Hoche	10,823		A			A		1897	*Konig Wilhelm II.* ..	
1887	Sans Pareil ..	10,470	1890	Magenta	10,680	1892	Tri Sviatitelia	12,480	1888	Re Umberto ..	13,087		*Ersatz-konig Wilhelm* ..	
1893	Barfleur	10,500	1887	Marceau	10,679		*Kniaz Potemkine Tavritchesky* ..		1890	Sardegna ..	13,640			
1892	Centurion ..		1887	Neptune	10,810	1894	*Petropavlovsk* ..	10,960	1891	Sicilia	13,087			
	A			A		1894	*Poltava*		1897	*E. Filiberto* ..	9,645			
1888	Nile	11,940	1891	Brennus	11,215	1895	*Sevastopol* ..		1897	*St. Bon*				
1887	Trafalgar ..		1894	Carnot	12,008		*Peresviet*	12,674						
1891	Empress of India	14,150	1893	Charles Martel	11,880		*Oslabya*							
1891	Hood		1893	Jauréguiberry	11,824									
1892	Ramillies ..		1895	Masséna	11,924									
1892	Repulse		1896	*Bouvet*	12,205									
1892	Resolution ..		1895	*Charlemagne* ..	11,275									
1892	Revenge		1896	*Gaulois*										
1892	Royal Oak ..		1896	*St. Louis*										
1891	Royal Sovereign			*Iéna*	11,870									
1895	Renown	12,350		A 9										
1894	Magnificent ..	14,900												
1895	Majestic													
1895	Prince George													
1895	Victorious ..													
1896	Cæsar													
1896	Hannibal ..													
1896	Illustrious ..													
1895	Jupiter													
1896	Mars													
	Albion	12,950												
1897	*Canopus*													
1898	*Goliath*													
	Glory													
	Ocean													
	Vengeance ..													
	Formidable ..	15,000												
	Irresistible ..													
	Implacable ..													
Total 38 Ships.*			Total 20 Ships.†			Total 12 Ships.			Total 10 Ships.			Total 7 Ships.‡		

* 3 Projected. † 1 (A 10) projected—A 9 will not be commenced till end of year. ‡ 2 (A. and B.) projected.

TABLE II.—SECOND-CLASS BATTLESHIPS.

ENGLAND.			FRANCE.			RUSSIA.			ITALY.			GERMANY.		
Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.
		Tons.			Tons.			Tons.			Tons.			Tons.
1875	Alexandra ..	9,490	1892	Bouvines ..	6,505	1887	Alexander II.	9,927	1878	Dandolo ..	11,025	1880	Baden	7,283
1882	Colossus	9,420	1893	Tréhouart ..	6,524	1890	Dvenadsat Apostoloff ..	8,076	1876	Duilio	10,962	1878	Baiern	
1882	Edinburgh ..		1873	Friedland ..	8,852	1889	Nicolai I. ..	9,672				1877	Sachsen	
1871	Devastation ..	9,330	1876	Redoutable ..	9,288	1894	Sissoi Veliky ..	8,880				1878	Württemberg ..	
1872	Thunderer ..		1885	Caiman	7,520	1896	*Rostislav*							
1875	Dreadnought ..	10,820	1883	Indomptable ..	7,513									
1876	Inflexible ..	11,880	1885	Requin	7,698									
			1881	Terrible	7,455									
				Henri IV. ..	8,948									
Total 7 Ships.			Total 9 Ships.			Total 5 Ships.			Total 2 Ships.			Total 4 Ships.		

Table III.—Third-Class Battleships.

ENGLAND.

Lnchd.	Name.	Displacement.
		Tons.
	A	
1881	Conqueror ..	6,200
1885	Hero	
1868	Hercules	8,680
1868	Monarch	8,320
1874	Neptune	9,310
1870	Sultan	9,290
1875	Superb	9,170
1876	Téméraire ..	8,540
	B	
1865	Bellerophon ..	7,550
1869	Audacious ..	
1869	Invincible ..	6,010
1870	Iron Duke ..	
1870	Swiftsure	6,910
1870	Triumph	6,640
1863	Achilles	9,820
1865	Agincourt ..	10,690
1863	Minotaur ..	10,690
1865	Northumberland	10,780
	Total 18 Ships.	

FRANCE.

Lnchd.	Name.	Displacement.
		Tons.
	A	
1875	Colbert* ..	8,783
1873	Richelieu* ..	8,984
1876	Trident* ..	8,717
	B	
1880	Bayard	5,915
1883	Duguesclin ..	6,112
1879	Turenne	6,249
1882	Vauban	6,112
	Total 7 Ships.	

RUSSIA.

Lnchd.	Name.	Displacement.
		Tons.
	A	
1872	Peter Veliky ..	9,891
	B	
1873	General Admiral	4,722
1875	Gerzog Edinburgski ..	5,050
1864	Kniaz Pojarski	5,138
1878	Minin	6,136
	Total 5 ships.	

ITALY.

Lnchd.	Name.	Displacement.
		Tons.
	B	
1865	Affondatore ..	3,997
1863	Maria Pia ..	4,201
1863	San Martino ..	
	Total 3 Ships.†	

GERMANY.

Lnchd.	Name.	Displacement.
		Tons.
	A	
1874	Deutschland ..	7,555
1874	Kaiser	
1884	Oldenburg ..	5,118
	B	
1874	Friedrich der Grosse* ..	6,663
1873	Preussen ..	
1868	König Wilhelm	9,603
	Total 6 Ships.	

* These ships are built of wood.

† These ships have a modern Q.-F. armament.

TABLE IV.—COAST DEFENCE SHIPS.

ENGLAND.			FRANCE.			RUSSIA.			ITALY.			GERMANY.		
Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.	Lnchd.	Name.	Displacement.
		Tons.			Tons.			Tons.						Tons.
1879	Agamemnon ..	8,660	1885	Achéron	1,693	1868	Adm. Chicagoff	3,511	Nil.		Nil.	1890	Beowulf	
1880	Ajax		1887	Cocyte	1,688	1868	Adm. Greig ..	3,593				1891	Frithjof	
1870	Abyssinia* ..	2,900	1892	Phlégéton ..	1,767	1867	Adm. Lazareff	3,556				1893	Hagen	
1876	Belleisle		1892	Styx (c)	1,767	1868	Adm. Spiridoff	3,500				1892	Heimdall	3,440
1879	Orion (a)	4,870	1885	Flamme	1,107	1867	Charodeika ..	2,026				1892	Hildebrand ..	
1870	Cerberus† ..	3,480	1884	Fusée	1,122	1875	Popoff	3,590				1889	Siegfried	
1871	Glatton	4,910	1888	Grenade	1,073	1873	Novgorod ..	2,706				1894	Odin	3,503
1871	Cyclops		1886	Mitraille ..	1,112	1892	Gremyastchy ..					1895	*Aegir*	3,503
1871	Gorgon		1877	Fulminant ..	5,871	1890	Grosjastchy ..					1878	Basilisk	
1871	Hecate	3,560	1883	Furieux	5,925	1892	Otvazny	1,492				1876	Biene	
1871	Hydra		1892	Jemmapes ..	6,485	1895	Khrabry					1878	Camaleon ..	
1870	Hotspur	4,010	1892	Valmy		1894	Adm. Senjavin					1879	Crocodil	
1870	Magdala* ..	3,340	1876	Tempête	4,793	1893	Adm. Oushakoff	4,126				1881	Hummel	
1872	Rupert (b) ..	5,440	1880	Tonnant	5,010	1896	*Gen. Adm. Apraxine* ..					1887	Mücke	1,091
			1875	Tonnerre	5,765							1880	Natter	
			1878	Vengeur	4,635							1880	Salamander ..	
												1877	Skorpion	
												1876	Viper	
												1876	Vespe	
Total 14 Ships.			Total 16 Ships.			Total 14 Ships.‡						Total 19 Ships.		

* Indian Marine. † Victorian Marine.

‡ Kreml, Pervenetz and Netron Menya, which are over 30 years old, omitted.

(a) At Malta. (b) At Gibraltar. (c) At Saigon.

TABLE V.—FIRST-CLASS CRUISERS.

ENGLAND.

Speed.	Name.	Displacement.
Knots.		Tons.
16½	Impérieuse	8,400 (Impérieuse, Warspite)
16½	Warspite	
18	Aurora	5,600 (Aurora to Undaunted)
18	Australia ..	
18	Galatea	
18	Immortalité ..	
18	Narcissus ..	
18	Orlando	
18	Undaunted ..	
21½	Blake	9,000 (Blake, Blenheim)
21½	Blenheim ..	
19¾	Crescent	7,700
20	Edgar	7,350
20	Endymion ..	7,350
19¾	Gibraltar ..	7,700
20	Grafton	7,350
20	Hawke	7,350
19¾	Royal Arthur ..	7,700
19¾	St. George ..	7,700
20	Theseus	7,350
22	Powerful	14,200 (Powerful, Terrible)
22	Terrible	
20½	*Andromeda* ..	11,000 (Andromeda to Niobe)
20½	Diadem	
20½	*Europa*	
20½	*Niobe*	
20¾	*Amphitrite* ..	11,000 (Amphitrite to Spartiate)
20¾	*Argonaut*	
20¾	*Ariadne*	
20¾	*Spartiate*	
21	*Aboukir*	12,000 (Aboukir to Sutlej)
21	*Cressy*	
21	*Hogue*	
21	*Sutlej*	

Total 34 Ships*

FRANCE.

Speed.	Name.	Displacement.
Knots.		Tons.
19	Bruix	4,679
19	Chanzy	4,855
19	Charner	4,716
19	Latouche Tréville	4,681
20	Dupuy de Lôme	6,305
19	Pothuau	5,275
19	Cecille	5,839
19	Tage	7,469
19	*D'Entrecasteaux*	8,114
23	*Jeanne d'Arc* ..	11,092
23	*Chateau Renault*	7,890
23	*Guichen*	8,146
23	*Jurien de la Gravière* ..	5,413
21	*Dupetit Thouars*	9,373 (Dupetit Thouars to C 8)
21	*Gueydon*	
21	*Montcalm* ..	
21	*C 4*	
21	*C 7*	
21	*C 8*	
21	*Desaix*	7,577 (Desaix, Dupleix, Kléber)
21	*Dupleix*	
21	*Kléber*	

Total 22 Ships.

RUSSIA.

Speed.	Name.	Displacement.
Knots.		Tons.
16½	Admiral Nahimoff	8,524
15½	Dmitri Donskoi	5,882
18	Pamyat Azova.	6,675
17	Vladimir Monomach	6,061
18	Rurik	10,933
20	Rossia	12,130
	Aurora	6,630 (Aurora, Diana, Pallada)
20	*Diana*	
20	*Pallada*	
20	*Gromoboi* ..	12,336

Total 9 Ships.

ITALY.

Speed.	Name.	Displacement.
Knots.		Tons.
20	*Carlo Alberto* ..	6,396 (Carlo Alberto, Vettor Pisani)
20	*Vettor Pisani* ..	
20	*G. Garibaldi* ..	6,732 (G. Garibaldi, Varese)
20	*Varese*	

Total 4 Ships.

GERMANY.

Speed.	Name.	Displacement.
Knots.		Tons.
21	Kaiserin Augusta ..	6,956
19	*Furst Bismarck*	10,482

Total 2 Ships.

* 4 projected.

TABLE VI.—SECOND-CLASS CRUISERS.

ENGLAND.			FRANCE.			RUSSIA.			ITALY.			GERMANY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.	Knots.		Tons.	Knots.		Tons.
17	Amphion		19½	Alger	4,313	17½	Admiral Korniloff	5,817	19	Marco Polo ..	4,527	20	Gefion	4,044
17	Arethusa	4,300	19	Isly	4,406	15½	Pamyat Merkuriya	3,000	20	Vesuvio	3,373	20	Irene	
17	Leander		19	Jean Bart ..	4,044	20	Svietlana ..	3,828	18	Etna	3,474	19	Prinzess Wilhelm	4,330
17	Phaeton		19¼	Bugeaud ..	3,681				17½	Fieramosca ..	3,542	21	*Freya*	
17	Forth		19¼	Chasseloup-Laubat ..	3,699				19	Stromboli ..	3,420	21	*Kausa*	
17	Mersey	4,050	19¼	Friant	3,680							21	*Hertha*	5,561
17	Severn		19¼	Pascal	3,925							21	*Victoria Luise*	
17	Thames		19	Descartes ..								21	*Vineta*	
19½	Astræa		17	Sfax	4,561									
19½	Bonaventure ..		20	Suchet	3,281									
19½	Cambrian ..		19	Cassard										
19½	Charybdis ..	4,360	19	D'Assas	3,890									
19½	Flora		19	Duchayla ..										
19½	Forte		19	*Catinat*	4,011									
19½	Fox		19	*Protet*	4,048									
19½	Hermione ..													
19¾	Æolus	3,600												
20	Andromache ..	3,400												
20	Apollo	3,400												
19¾	Brilliant	3,600												
19¾	Indefatigable ..	3,000												
19¾	Intrepid	3,600												
19¾	Iphigenia ..	3,600												
20	Latona	3,400												
20	Melampus ..	3,400												
20	Naiad	3,400												
19¾	Pique	3,600												
19¾	Rainbow ..	3,600												
19¾	Retribution ..	3,600												
20	Sappho	3,400												
20	Scylla	3,400												
19¾	Sirius	3,600												
19¾	Spartan	3,600												
20	Sybille	3,400												
20	Terpsichore ..	3,400												
20	Thetis	3,400												
20	Tribune	3,400												
19½	Diana													
19½	Dido													
19½	Doris													
19½	Eclipse													
19½	Isis	5,600												
19½	Juno													
19½	Minerva													
19½	Talbot													
19½	Venus													
19	Arrogant ..													
19	*Furious*	5,800												
19	*Gladiator* ..													
19	*Vindictive* ..													
20	*Hermes*													
20	*Highflyer* ..	5,600												
20	*Hyacinth*													
Total 53 Ships.			Total 15 Ships.			Total 3 Ships.			Total 5 Ships.			Total 8 Ships.†		

† 2 projected.

Table VII.—Third-Class Cruisers.

England.			France.			Russia.			Italy.			Germany.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
Knots.		Tons.	Knots.		Tons.	Knots.		Tons.	Knots.		Tons.	Knots		Tons.
18	Iris	3,730	19¼	Coëtlogon ..	1,901	15	Rynda	3,508	21	Piemonte ..	2,500	16	Blitz	1,360
18	Mercury		20½	Cosmao	1,923				19	Calabria	3,508	16	Pfeil	
16¾	Fearless	1,580	20½	Forbin	1,791				19½	Dogali .. .	2,055	16½	Buzzard	1,827
16¾	Scout		20½	Lalande	1,895				18	Elba	2,690	16	Condor	
16½	Archer		20½	Surcouf	2,012				17½	Giovanni Bausan	2,922	16	Cormoran ..	1,614
16½	Brisk		20½	Troude	1,994				19	Etruria		16	Geier	
16½	Cossack		20	Davout	2,979				21	Lombardia ..	2,245	16	See-Adler ..	
16½	Mohawk	1,770	20	Linois	2,308				18	Liguria		15½	Falke	1,703
16½	Porpoise		20	Galilée	2,280				18	Umbria		23	Greif	1,971
16½	Racoon		20	*Lavoisier* ..					20	*Puglia*	2,550	23	*Hela*	1,971
16½	Tartar		20½	*D'Estrées* ..	2,413									
17	Alacrity	1,700	20½	*Infernet* (*ex* h 2)										
17	Surprise													
17¾	Barham	1,830												
17¾	Bellona													
16¾	Barracouta ..	1,580												
16¾	Barrosa													
16¾	Blanche													
16¾	Blonde													
19	Magicienne ..	2,950												
19	Marathon ..													
19	Melpomene ..													
19	Medea	2,800												
19	Medusa													
19	Pallas	2,575												
19	Pearl													
19	Philomel													
19	Phœbe													
19	Katoomba ..													
19	Mildura													
19	Ringarooma ..													
19	Tauranga ..													
19	Wallaroo													
20½	Pelorus	2,135												
20	*Pandora*													
20	*Proserpine* ..													
20	*Pactolus*													
20	*Pegasus*													
20	*Perseus*													
20	*Pioneer*													
20	*Pomone*													
20	*Prometheus* ..													
20	*Psyche*													
20	*Pyramus*													
Total 44 Ships.			Total 12 Ships.			Total 1 ship.			Total 10 Ships.			Total 10 Ships.		

Table VIII.—Torpedo Gunboats.

ENGLAND.

Speed.	Name.	Displacement.
Knots.		Tons.
19	Grasshopper ..	
19	Sandfly	525
19	Spider	
18½	Rattlesnake ..	550
20	Assaye	
20	Boomerang ..	
20	Gleaner	
19	Gossamer ..	
20	Karrakatta ..	
20	Plassy	
20	Salamander ..	735
20	Seagull	
20	Sharpshooter .	
20	Sheldrake ..	
20	Skipjack ..	
20	Spanker ..	
20	Speedwell ..	
19	Alarm	
19	Antelope	
19	Circe	
19	Hebe	
19	Jaseur	
20	Jason	810
19	Leda	
19	Niger	
19	Onyx	
19	Renard	
20¼	Speedy	
19	Dryad	
19	Halcyon	
19	Harrier	1,070
19	Hazard	
19	Hussar	
18	Polyphemus ..	2,640

Total 34 Ships.

FRANCE.

Speed.	Name.	Displacement.
Knots.		Tons.
17¾	Condor	1,220
17	Epervier	1,268
17½	Faucon	1,220
18	Fleurus	1,289
17½	Vautour	1,220
18½	Wattignies ..	1,272
18½	Bombe	413
18	Couleuvrine ..	428
18	Dague	402
18	Dragonne ..	403
18	Flèche	418
18	Lance	395
18	Sainte-Barbe ..	430
18	Salve	406
18¾	Léger	509
18½	Lévrier	497
21½	Casabianca ..	945
21½	Cassini	943
21½	D'Iberville ..	952
23	*Dunois*	882
23	*La Hire*	

Total 21 Ships.

RUSSIA.

Speed.	Name.	Displacement.
Knots.		Tons.
20	Captain Sacken	742
20	Lieutenant Ilyn	714
22	Gaidamak ..	
22	Vzadnik	400
22	Griden	
21	Kazarsky ..	
22	Posadnik ..	462
22	Voevada	448
	Abrek	535

Total 9 Ships.

ITALY.

Speed.	Name.	Displacement.
Knots.		Tons.
20	Aretusa	833
20	Calatafimi ..	833
21	Caprera	833
17	Confienza ..	768
20	Euridice	833
19	Goito	812
19½	Iride	833
19	Minerva	833
19	Montebello ..	814
19	Monzambano ..	840
19	Partenope ..	833
18	Tripoli	848
20	Urania	833
20	Saetta	400
20	Folgore	370
22	*Agordat*	1,292
26	*Coatit*	1,292

Total 17 Ships.

GERMANY.

Speed.	Name.	Displacement.
Knots.		Tons.
19	Jagd	1,230
19	Wacht	
22½	Komet	931
21	Meteor	

Total 4 Ships.

The Durandal and Hallebarde and 8 Division Boats have been taken out of these lists as being more properly Destroyers.

CHAPTER IV.

The Russian Navy.*

CENTRAL ADMINISTRATION.

The Emperor is in supreme command of the Naval as well as the Military Forces. The organisation, numbers, and composition of the forces, appointments, promotions, rewards, etc., depend on his will. He exercises his authority in the Navy through the General-Admiral (usually a member of the Imperial Family), who is the Commander-in-Chief of the Navy and head of the Marine Department.

Departments.

The head of the Central Administration is selected by the Emperor from the list of Vice-Admirals, and has under the supervision of the General-Admiral the general control of Naval business which is distributed among the following Departments:—

(1) Admiralty Council.
(2) Naval Headquarters Staff.
(3) Supreme Naval Court.
(4) Chief Law Board.
(5) Hydrographer.
(6) Board of Construction and Supply.
(7) Technical Committee.
(8) Admiralty Office.
(9) Chief Medical Board.
(10) Record Office.
(11) Good Service Pension Fund.
(12) Printing Office.

Admiralty Council.

(1) The Admiralty Council consists of the General-Admiral as President, the Minister of Marine as Vice-President, and ten Flag-Officers as members. It is responsible for the Navy Estimates, and for all establishments under the Minister of Marine. It revises new regulations and additions to, or modifications of, existing laws and regulations, and the Navy List. It deals with questions of prize-

* This chapter was written [in English] by Lieut. A. Stroumillo, of the Russian Admiralty, by kind permission of the Minister of Marine.

money, and all financial matters which cannot be dealt with by the authority of the Minister. The members inspect vessels and Naval establishments, and report upon them to the General-Admiral.

Chief of the Staff.

(2) The Naval Headquarters Staff is under a Vice-Admiral, and is divided into two branches—the Naval Intelligence and the Personnel Branch. The Chief of the Staff is the head of the *personnel* of the Navy, but is subordinate to the Minister, and responsible to him for its efficiency as well as for that of the fleet. He deals with the training, organisation and normal establishment of the *personnel*, and with the composition of fleets, squadrons, and divisions. He inspects all vessels, "equipages," * and Naval establishments, prepares schemes of mobilisation, draws up proposed plans of action, and gives all orders for the movements of individual ships, squadrons, and fleets in time of peace and war. Naval pensioners, the Naval prison, and Naval telegraph stations are also under his charge.

Naval Intelligence Branch.

The Naval Intelligence Branch deals with the sea-going Navy, and the regulations for training, mobilisation and coast defence; collects information concerning the Navies and the coast-defences of foreign Powers, and conducts the correspondence with the Naval *attachés* and Consular officers. Under the immediate direction of the Chief of the Staff, the Intelligence Department prepares the annual cruising programme, regulations for coast defence, and instructions to Commanders at home and abroad.

The Personnel Branch, under the Assistant-Chief of the Staff (a rear-admiral), is divided into several sections for the manning and officering of the fleet, and deals with the recruiting, appointment, promotion, retirement, and pay of all officers and men.

Supreme Naval Court.

(3) The Supreme Naval Court in St. Petersburg is the Court of Appeal from the Naval Courts in each port. It is composed of an Admiral as President, two Vice-Admirals and three Lieutenant-Generals.

Chief Law Board.

(4) The Chief Law Board conducts the business of the Supreme Naval Court and the correspondence of the Minister of Marine on Judicial Matters. It is under the Attorney-General of the Supreme Naval Court.

(5) The Hydrographer's Department is under a Vice-Admiral, who is responsible for surveys, charts, nautical instruments, the general direction of the Hydrographic service, and for the Naval Library.

Board of Construction.

(6) The Board of Construction and Supply, with a Vice-Admiral

* An "equipage" is the unit of organisation for the *personnel* of the Navy see p. 80.

as chief, is divided into three sections, viz., (1) Construction section, which has charge of the execution of the shipbuilding programme; (2) Section responsible for the maintenance of a proper supply of stores of all kinds; (3) Financial section, which has charge of the accounts of all money and stores for the entire Naval department.

(7) The Technical Committee is presided over by a Vice-Admiral, and is composed of the directors and assistant-directors of Naval Construction, machinery, Naval Ordnance, torpedoes, and Naval Works. This Committee considers all improvements in ship and engine construction, in ordnance and torpedoes, issues instructions for trials of guns, considers plans and specifications for building docks, patterns of guns, etc. The members visit and survey the various ships in progress at the dockyards to see that the designs are being carried out in all details. **Technical Committee.**

(8) The head of the Admiralty Office is also the Jurisconsult of the Navy. He conducts the correspondence of the General-Admiral, compiles the reports on the Navy to be submitted to the Emperor, and codifies Naval regulations, etc.

(9) The Chief Medical Board is presided over by the Medical Inspector of the Fleet, and controls the medical services and Naval hospitals.

Dockyard Administration.

The Naval ports of the Empire are divided into two classes. Of the first class are Cronstadt, St. Petersburg, and Nicolaieff; of the second, Revel, Sveaborg, Sebastopol, Batum, Baku, and Vladivostock. Besides these there are Astrabad in the Caspian Sea, and the building port of the Emperor Alexander III. at Libau. The administration of the first-class ports (except St. Petersburg, which is under special regulations), is in the hands of commanders-in-chief selected from the list of vice-admirals and appointed by the Emperor. To each second-class port a rear-admiral is appointed as captain of the port, and is responsible for the administration under the Minister of Marine. The captains of the Black Sea ports, however, are directly subordinate to the Commander-in-Chief of Nicolaieff, who is thus the Commander-in-Chief both of the Fleet and the ports of the Black and Caspian Seas.

The Commander-in-Chief is responsible for all Naval and dockyard establishments, as well as for the *personnel* of the port and all vessels within its limits. His assistants are (1) the Chief of the Staff as regards the military administration of the *personnel* and

matériel; (2) the captain of the port in all matters concerning the economy of the port, shipbuilding, engineering, and armament of vessels; and (3) the Head Doctor of the Naval Hospital, who is also the Medical Inspector of the Port, in matters concerning the medical service.

The *personnel* of the dockyard may be divided into two branches, workmen and dockyard police. The workmen's branch comprises the permanent staff, and hired workmen who are entered as required by voluntary enlistment.

The administration of a first-class port is distributed as follows:—

Staff under the Chief of the Staff, a rear-admiral.
Dockyard office under the Rear-Admiral, who is captain of the port.
Shipbuilding and workshops under the Chief Constructor of the port.
Magazines and storehouses under the chief storekeeper.
Engineering under the Chief Engineer of the port.
Ordnance, torpedoes, and Naval construction, under their respective heads.

Besides the above, the Commander-in-Chief supervises Naval observatories and compass-testing observatories, Naval Records, the Jurisconsult, and the hospitals.

Second-class ports have only a part of the above branches.

PERSONNEL.

Organisation. "Equipages."

The whole *personnel* required for manning and officering the Navy is divided on shore into war units called "marine equipages." The military administration of these "equipages" is entrusted to the commanders of "equipages," and to the senior Admirals in command of divisions. The nucleus of an "equipage" is the crew of a first-rate man-of-war. The crews of vessels of other rates are distributed to the "equipages," so as to make the number of men in each from 900 to 1100. All "equipages" are divided into companies of about 150 men commanded by lieutenants with one or two sub-lieutenants as subalterns. Usually the crew of a battleship forms the first four companies of an "equipage," the total number of which varies from seven to twelve. The "equipages" of the Baltic Fleet form two regular Naval divisions, and those of the Black Sea Fleet—the Black Sea Division. The total number of officers and

men on active service afloat and ashore in the Russian Navy is about 44,000, distributed as follows:—

Baltic Fleet, about 28,900 officers and men	18 "equipages" forming the two Naval Divisions at Cronstadt. 1 "equipage" of the Imperial Guard at St. Petersburg. A "half-equipage" at Revel. 1 company at Sveaborg.
Black Sea Fleet, about 11,600 officers and men	8 "equipages" forming the Black Sea Division, with its headquarters at Nicolaieff, four of these being stationed at Sebastopol.
Caspian Sea Flotilla	1 "equipage" at Baku.
Pacific Squadron	1 "equipage" at Vladivostock.

The crews of vessels building at St. Petersburg form the St. Petersburg Division, which is commanded by a rear-admiral, and at present comprises three "equipages" out of the eighteen of the Baltic Fleet.

The staff of an Admiral of Division consists of a rear-admiral as second-in-command, a captain as chief of staff (flag-captain), a flag-lieutenant, a gunnery lieutenant, a torpedo lieutenant, an engineer, a navigating officer and a surgeon.

The senior captain of a first-rate man-of-war is at the same time the commander of the "equipage." Independently of his duties as captain, he is responsible for the carrying out of all service orders, and for the training and whole interior economy of the "equipage." Captains of the other vessels of the "equipage's" complement administer their crews independently, but are subordinate to the commander of the "equipage." In each "equipage" there is a treasurer (civil grade) and an adjutant who is selected from the list of officers of the military branch. Everyone belonging to the military and civil branches on the list of the "equipage" is proportionately distributed among the companies of the ship's crew.

Officers.

The officers of the Navy are divided into two branches—military and civil. The officers of the military branch are sub-divided into three main classes as follows:—(1) Admirals—admirals, vice-admirals, rear-admirals. (2) Staff Officers (senior)—first-class captains, captains second-class (commanders). (3) "Ober-officers" (junior)—lieutenants, "mitchmans" (sub-lieutenants).

The officers of the civil branch are organised, according to their specialty, in different corps, viz., corps of Naval Ordnance, Navi-

gators,* Naval Constructors, Engineers, Naval Works, Admiralty Officers, and Medical Officers, and lastly, the strictly civil grades. As will be seen by the table on the opposite page, officers of the executive and civil branches have corresponding rank.

The present establishment of officers comprises :—

1 General-Admiral.
15 Admirals.
316 Superior Officers.
1326 Junior Officers.
376 Engineers.
521 Medical Officers and civil grades.
95 Admiralty Officers.

Entry and training officers.

Officers of the military branch are entered annually (1) from the Naval Cadet Corps at St. Petersburg; or (2) from young men who, having received a superior education and completed a certain sea service (as volunteers), pass the required examinations. The number of cadets at present is 522, but owing to the want of officers it will be increased to 600 during the coming year. The course of training lasts six years. Cadets for the first three years receive an ordinary education, and for the last three, a professional education. For administrative purposes, the cadets are divided into six companies. Those of the two senior companies are called "guarde-marine" (midshipmen). In summer, midshipmen and cadets are sent for practical instruction to the five masted cruisers forming the cadet corps training division, on board which they make five cruises. The first three, of three months' duration, are devoted to the study of navigation, seamanship, machinery, torpedoes and gunnery. The fourth cruise, in consequence of the abolition of the Corps of Navigators, is wholly devoted to navigation, including astronomic observations ashore, coast surveys and sounding. The last cruise is of four months' duration, after which midshipmen are promoted by special examination to the rank of sub-lieutenant. In 1897 fifty-three passed their examinations successfully. Admission to the Naval Cadet Corps is open to boys between the ages of twelve and fourteen by a competitive examination, but only the sons of naval and military officers and of noblemen are eligible. The course begins on the 1st September and ends in the beginning of May. The hours of study are fixed at not more than twenty-eight

* In 1885 the Corps of Naval Ordnance and Navigators were abolished, and the *personnel* was allowed to die out. The few officers who are on the active list continue to carry out their former duties.

Relative Rank of Officers in the Navy and Army.

Class.	Navy.					Army.
	Military Branch.	Civil Branch.				
		Corps of Naval Ordnance. Corps of Navigators. Corps of Admiralty Officers.	Corps of Engineers.	Corps of Naval Constructors.	Naval Works Corps.	
1	General-Admiral.	..	..	..	..	Field-Marshal.
2	Admiral.	General.	..	..	..	General.
3	Vice-Admiral.	Lieutenant-General.	..	..	..	Lieutenant-General.
4	Rear-Admiral.	Major-General.	Inspector of Machinery.	Inspector of Naval Construction.	Inspector of Construction.	Major-General.
5	—	—	—	—	—	—
6	Captain I. Rank.	Colonel.	Fleet Engineer.	Senior Naval Constructor.	Chief Constructor.	Colonel.
7	Captain II. Rank (Commander)	Lieutenant-Colonel.	Senior Engineer.	Junior Naval Constructor.	Senior Constructor.	Lieutenant-Colonel.
8	—	—	—	—	—	—
9	Lieutenant.	Captain.	Assistant Senior Engineer.	Senior Assistant Naval Constructor	Junior Constructor.	Captain.
10	..	Staff Captain.	..	..	..	Staff Captain.
11	—	—	—	—	—	—
12	Mitchman. (Sub-Lieutenant).	Lieutenant.	Junior Engineer.	Junior Assistant Naval Constructor	..	Lieutenant.
13	—	Sub-Lieutenant.	..	..	..	Sub-Lieutenant.

per week. Examinations are held only three times during the six years; one competitive entrance examination, one during the course, and one before leaving the corps.

Engineers.

In the Engineers corps, men who have passed the competitive and medical examinations are entered between the ages of sixteen and nineteen, and attached to the Naval Technical School at Cronstadt. During the first three years they receive a practical training in the machinery shops at Cronstadt Dockyard, and on board a gunboat and two sea-going torpedo-boats specially attached to the school. During the last summer they are attached to vessels of the Baltic Practice Squadron. The school also trains constructors, who, with the engineers, form the two principal corps of the civil branch of the Navy. At the present time the Engineers Corps on the active list numbers 293, viz., three inspectors of machinery, fifteen fleet engineers, ninety-two senior engineers, one hundred and seventeen assistant senior engineers, and sixty-six junior engineers.

Naval constructors.

The corps of Naval Constructors comprises two inspectors of shipbuilding, fourteen senior constructors, seventeen junior constructors, thirty-one senior and twenty-six junior assistant constructors.

Officers of the military branch, as well as engineers and constructors, go through an advanced course of instruction at the Nicolas Naval Academy at St. Petersburg, which is divided into three sections: the hydrographic, construction, and engineering sections. The course is of two years' duration, and the number of students twenty. Besides this there is at the academy a seven months' course for fifteen officers of the military branch every year. The instruction given at this course includes strategy, tactics, gunnery, torpedoes, mobilisation, etc.

Gunnery officers.

Gunnery officers are selected from the lieutenants who have been through the higher course of instruction in the theory and practice of gunnery at the Naval Artillery School or at the Artillery Academy of the Army. The artillery school is at Cronstadt, and is divided into two branches, one for officers and the other for men. A practical training is given on board the gunnery training division, which consists of several vessels of different types. The course is of one year's duration, including the four months' cruise.

Navigating officers.

Navigating duties in the Navy are carried on by selected officers of the military branch. They can receive higher instruction at the hydrographic branch of the Naval Academy. The first ten officers of this branch who have passed successful examinations have some privileges in promotion during their further service.

Torpedo officers.

Torpedo officers are selected from lieutenants and engineers who have gone through extensive courses in the theory and practice of

torpedoes, electricity, explosives, physics and chemistry at the torpedo officers' class at Cronstadt. The length of the course for officers of the military branch is one year, including the time of examinations and training on board the torpedo training division. The staff of the torpedo officers' class comprises six professors, four military and two civil. The military professors take charge of the courses on electric light, torpedoes generally, Whitehead torpedoes, and high explosives; the civil professors, those on electricity and chemistry. The number of student officers is twenty-four, the same number as at the gunnery school. Officers who have passed successful examinations are taken as second-class torpedo officers, and officers who have completed their training at the artillery school as second-class gunnery officers. During their further service they are appointed as first-class specialists, and carry on their duties on board vessels of the first rate. The course for engineers lasts only six months, from the 1st October till the 1st April. There are also repeated courses in torpedoes for the men, and all engineers and junior officers join the torpedo officers' class for a one month's course.

All duties requiring special knowledge in military engineering are carried out by engineers who have received superior instruction at the Engineering Academy or at one of the Civil Engineering Institutes at St. Petersburg.

Legal branch.

Candidates for the legal branch are taken from officers of the military branch. They are required to pass through a three years' course at the Academy of Military Law at St. Petersburg. Only one place is reserved annually for the officers of the Navy.

Specialists in metallurgy are selected from those engineers and gunnery officers who have received an advanced course of instruction at the Mining Institute. They are required for the Navy as receivers of guns, armour, and projectiles.

"Small-arm men" are taken annually from the Naval School at Oranienbaum, where both officers and men are taught shooting and gymnastics, as well as cutlass, rifle and quick-firing gun drill, and, after passing through a one year's course, are appointed instructors for men. Besides these, two lieutenants are sent annually to the Army Musketry school, where officers are trained in the duties of commanders of battalions.

Both officers and men are trained as divers at the Diving School at Cronstadt.

The officers of the medical branch are taken from the Army and from those who have passed successful examinations at the Military Academy of Medicine.

Admiralty Officers.

The officers of the Admiralty are selected only from Naval officers occupying permanent places on the establishment of the Ministry of Marine, the dockyard administration, the marine schools, etc.

Paymasters.

There is no paymasters' corps in the Russian service as in other Navies, and all duties usually pertaining to the pay or commissariat corps are performed by officers of the military branch selected by captains. They are assisted by storekeepers of the civil grades, warrant officers and petty officers. As the results of the system are not quite satisfactory, it is proposed shortly to appoint a committee on the general question of substituting a separate corps of paymasters for officers of the military branch.

Men—Conscription.

By an Imperial edict of the 1st January, 1874, military service has been rendered obligatory for all classes, and a law fixes annually the number of men needed for the Navy. The average number levied for the years 1890–1896 was 7000. In 1897 there were levied 11,000 men. They are recruited by conscription throughout the maritime districts, conscription carrying with it certain benefits to the seafaring population as in other countries. All men from their twenty-first year are liable to service, decided by lot, which is drawn only once in a man's life. Those who draw a lot liberating them from active service are enlisted in the "opolchenie" (militia). The *personnel* of the Navy consists of the active force and the reserve. The period of service is ten years, seven of which are on the active list and three on the reserve list. Though military service has been declared obligatory for all, some reductions of service, privileges, exemptions, and adjournments are granted on account of physical defects, family and material position, and education. Sailors on the active list are not allowed to marry.

Military branch.

The men of the Navy, like the officers, are divided into two branches—the military and the civil branch. The former comprises:—

(1) Chief boatswains, boatswains, petty officers, and sailors. There is at Cronstadt a special training school for the organisation in the Navy of a thoroughly instructed class of quartir-meisters (petty officers). Two training ships are annually commissioned—one training petty officers for the Baltic Fleet, cruising in the Atlantic and to the West Indies; and one in the Mediterranean for petty officers of the Black Sea Fleet. The course at the school for the recruits destined to be petty officers is divided into two parts. The first is of seven months' duration, and includes the common sciences and military training ashore. The second part lasts for a year, during two months and a half of which the training ship is out of commission, while during nine and a half months she cruises in

foreign waters. The seamen are divided into two classes, according to their rate of pay, and with certain exceptions, such as those who enter in some special branch, have no future, and remain seamen till their transfer to the reserve list.

(2) Gunnery warrant officers, gunners, including petty officers, gun-captains, riflemen, armourers.

(3) Torpedo warrant officers, petty officers, miners, torpedo engine petty officers and torpedo engineers. The above specialists for the Baltic Fleet are taken from the gunnery and torpedo schools at Cronstadt. In the Black Sea the selected seamen go through courses of theoretical instruction during the winter months in a special training ship; and through a practical training in the summer months on board specially commissioned ships or vessels of the Black Sea Practice Squadron.

(4) Helmsmen and signalmen, who are taken from special schools established at Cronstadt, Nicolaieff, and Sebastopol.

(5) Instructors in shooting and gymnastics, and "riflemen," are trained at the school already mentioned at Oranienbaum. During the summer a sea-going torpedo boat is attached to the school.

(6) Divers are taken from the school at Cronstadt.

Civil branch.

The men's civil branch comprises: Engine-room petty officers, engine-room artificers, stokers, assistant surgeons and writers. They are all trained in different special schools at Cronstadt and Nicolaieff.

Petty officers, after two years' service and passing special examinations, can be promoted to "conductor" (warrant) rank. In the military branch of the "conductor" rank are boatswains, torpedo and gunnery "conductors"; and in the civil branch are the chief engine-room artificers, chief assistant surgeons, chief stewards, storekeepers. Men of the "conductors'" rank correspond to the warrant officer rank in the English Navy, the only distinction being that they never carry out on board ship officers' duties, such as watch-keeping at sea, etc.

Promotion.

Promotion takes place only when vacancies exist, and is subject to certain conditions, viz., length of sea service, of service as senior officer afloat, and of service in command of ships and squadrons. Promotions are made twice a year—on the 6th December and Easter Day. The promotion of midshipmen depends on the examinations they pass before a board presided over by a Vice-Admiral, who determines their seniority. They are required to have at least thirteen months' sea service in the Cadets Corps Training Division. In order to become a lieutenant a "mitchman" must have served afloat forty months altogether, including sea service as midshipman and cadet. A lieutenant may be promoted to be captain of II. rank if he has

completed fifty-eight months' sea service in the grade. Sea service on board vessels of the practical and training squadrons for lieutenants and sub-lieutenants is reckoned in a special manner, viz., three days are counted for four. The grade of captain of I. rank cannot be attained if the captain of II. rank has not had twelve months' sea service as senior officer (viz., second-in-command) of a warship, and at least twelve months' sea service in command of a ship of the second rate. The conditions for promotion to the rank of rear-admiral are four years in command of a ship of the first rate, eight months of which afloat in home waters or twelve months abroad. Rear-admirals to become vice-admirals must have commanded at sea a division or a squadron during twelve months in home waters or twenty-four months abroad. The above conditions of promotion are not easily fulfilled owing to the fact that the fleet is laid up in the winter months and the whole *personnel* is sent ashore. Promotions to the grade of admiral are subject to no special requirements as to service in the next lower grade, and absolutely depend on the selection of the Emperor. In time of war there are special clauses for promotion. Promotions to the grades of lieutenant, captain of II. rank and captain of I. rank are made partly by seniority and partly by selection, to the grade of rear-admiral exclusively by selection, and to the grade of vice-admiral only by seniority. In the gunnery, navigating and engineer corps promotions are also made partly by selection and partly by seniority, though the sea service required is much shorter.

Inactive list.

Officers or engineers who have no longer the right of serving on the active list are transferred to the inactive list (fleets' list), but remain liable for active service. Such transfers are made in the following cases:—1. Sebastopol heroes; 2. Officers having completed their obligatory sea service but not promoted to the next higher grade before they reach the age limit owing to default of vacancies; 3. Officers occupying permanent posts on shore and not having been at sea during four years for junior officers, seven years for superior officers, and ten years for admirals; 4. Officers carrying on duties in other departments. Officers on the inactive list after a certain time are retired.

The reserve and retired lists.

All officers and engineers who have received a training at the Naval Cadet Corps or the Technical School, and volunteers, are obliged by the regulations to serve two years on the active list (officers educated at the school at the Government expense, four and a half years), and twelve years in the reserve. Every officer not desiring to serve on the active list may, after two years, ask to be enrolled on the reserve list, on which he remains till the expiration of the obligatory term

of service in the reserve. He may be called upon at any time to serve temporarily on active service. Retirement is voluntary or compulsory. Officers who have not completed their time are only allowed to resign on account of physical unfitness. They may be discharged on reaching the age limit, for physical defect, on the proposal of superior authority, and by court-martial. After retirement an officer of unblemished service can obtain the following rights: (1) right of wearing the uniform after retirement, (2) promotion to the next higher rank with its pay and pension.

An officer having completed the obligatory sea service in his rank, and not being promoted from want of vacancies, is retired when he reaches the age limit, which for the different ranks is as follows:— Age limit.

Sub-lieutenant . . .	10 years service in the rank.
Lieutenant	47 years.
Captain of II. rank . .	51 „
Captain of I. rank . .	55 „
Rear-Admiral . . .	60 „
Vice-Admiral . . .	65 „

There is no age limit for the grade of Admiral. The age limit for officers of the civil branch corresponds to the above.

The full pay of officers of the Navy consists of shore pay, table money and sea pay. The shore pay depends wholly upon rank, and is of three classes: the first for officers of the Baltic and Black Sea Fleets, the second for officers of the Caspian flotilla and ports, and the third and highest for officers serving in Siberia. Table money is paid in all fleets according to the position held. Sea pay is granted according to the duties performed on board ship independently of the rank, and is paid exclusively during sea service. Sea pay is of two classes: the first being for sea service in home waters, and the second for sea service in foreign waters, and for officers serving on board vessels of the Siberian "equipage." The first hundred lieutenants having completed the required sea service in the rank, receive the pay of lieutenant-commander, a rank which is abolished at present. Captains who have commanded for a long time vessels of the first two rates, and engineers who have been long in charge of engines receive a supplementary allowance. There are also many other allowances, such as those for torpedo and gunnery duties, and for assistance in the education of their children, to which all officers have a right who have completed a certain term of sea service. Pay.

Officers who have served thirty-five years on the active list are entitled to the full pension from the Government Treasury. It varies Pensions.

according to the rank of the retired officer, from about £45 to £150 a year. Twenty-five years' service gives the right to only one half of this pension. Besides the Government pension there is also the pension from the Good Service Pension Fund, established for all persons serving in the Navy and their families. The revenue of this fund is derived from a deduction of 6 per cent. from the shore pay of all serving in the Navy. As with the Government pension, the pension from the Good Service Pension Fund is of two classes: the higher for persons having served thirty-five years and more, and the lower for persons having only served twenty-five years. For instance, an officer having served thirty-five years receives about £125 from the Good Service Pension Fund. In addition to the pension, officers may receive a gratuity for length of sea service, or of command, the latter being two-thirds of the shore pay for 180 months in command of a ship. Officers of the civil branch after retirement are entitled to pensions equal to that of the officers of the military branch.

Matériel.

The history of shipbuilding for the Navy in Russia since the end of the Crimean War may be divided into two main periods: the first up to the year 1882, and the second since 1882, when the strengthening of our war Navy was begun. During the beginning of the first period the transition from the sailing fleet to the steam fleet was in progress, and then appeared our first steam vessels, represented by frigates, corvettes, gun-vessels, and other types. The construction of ironclads in Russia dates from 1867, the first built being monitors and turret-ships with a displacement of about 1500 tons. As the resources for the supply of war *matériel* grew, vessels of greater displacement were built, and since 1886 large battleships and cruisers of 12,000 tons have been launched at our dockyards, and machinery, as well as armour, guns, torpedoes, and other war *matériel*, are now manufactured to a great extent in Russia. The vessels built up to 1882 differ widely in their general design and fighting qualities from the ships constructed since 1883, but together constitute the existing Navy, which comprises the Baltic Fleet, Black Sea Fleet, the Siberian "equipage," and the Caspian flotilla, each having a *personnel* and *matériel* quite independent of each other. Besides the war Navy Russia possesses a coastguard flotilla in the Baltic Sea under the Minister of Finance, but re-attached to the Ministry of Marine in case of war. The vessels forming this flotilla are small steam cruisers usually commanded by lieutenants temporarily borrowed from the Navy.

The existing fleet.

For the purposes of home defence, all ships belonging to the Navy have been divided into four classes as follows:—

Classification of ships.

First rate: Imperial yachts, battleships, coast-defence ironclads, first-class cruisers; total 45 vessels.

Second rate: coast-defence ironclads of smaller displacement, sea-going gunboats, training-ships, second-class cruisers, torpedo cruisers, steamers, transports; total 67 vessels.

Third rate: coast-defence gunboats, sea-going torpedo-boats, coastguard ships, lightships; total 145.

Fourth rate: small torpedo craft and other small vessels; total 125.

Those ships which have a fighting value, and which might render certain service, are mentioned below.

The official list comprises at present 155 effective men-of-war; namely, eighteen battleships, twenty-four coast-defence ironclads, seventeen first-class cruisers, eleven second-class cruisers, nine torpedo cruisers, seventeen gunboats, ten coast-defence gunboats, sixteen steamships, six yachts, twenty transports, seven training-ships. In this list are included four battleships, one coast-defence ironclad, and one first-class cruiser completing afloat and under trials, and three battleships and four first-class cruisers building.

Battleships. Baltic.

The largest and most powerful battleships in the Baltic Fleet are the three sister battleships, Poltava, Petropavlosk, and Sevastopol, of 10,960 tons and 17 knots speed, launched in 1894–95, and now going through their trials. They are heavily armoured, and carry four 12-in. guns, as well as a powerful secondary and quick-firing armament. Next on the list of completed ships come the Navarin, 10,206 tons, Imperator Alexander II., 9927 tons, Imperator Nicolai I., 9672 tons, Sissoi Veliky, 8800 tons, and Peter Veliky, 9891 tons. These ships, when united in one squadron, would steam about 15 knots, except the Peter Veliky, which dates from 1872 and is slower.

The two sister battleships Peresviet and Osliabia, of 12,674 tons and 18 knots speed, which are building on the Neva for the Baltic Fleet, will be launched this year. These ships have already been described in the *Naval Annual*. The protection is very complete, and is of Harveyed steel armour, 9–7 in. thick on the belt, 9 in. on the barbettes, and $1\frac{3}{4}$ to $2\frac{3}{4}$ in. on the deck. Armament, four 10-in. guns, eleven 6-in. Q.-F. (45 cal.) in armoured casemates, sixteen 3-in., ten 1·8-in., seventeen 1·4-in., and two Baranovsky Q.-F. guns, and six torpedo tubes. There are three vertical triple-expansion engines, of 14,500 I.H.P., and thirty-three Belleville boilers. The coal

capacity at load draught (26 ft.) is 1063 tons, which gives a coal endurance of 3060 miles. With 2058 tons the endurance is 5815 miles. Complement, 732.

Black Sea.

In the Black Sea Russia possesses a powerful fleet of seven battleships, viz., the Catherine II., with her sister ships, Tchesma and Sinope, of 10,181 tons and about 14 knots, launched in 1885–86, the Dvenadzat Apostoloff, 8706 tons, Georgi Pobiedonosetz, 10,280 tons, Tri Sviatitelia, 12,480 tons, and the recently-launched Rostilav, 8800 tons, of the Sissoi Veliky type. To these will be added this year one battleship of the Tri Sviatitelia type now building at Nicolaieff, the Kniaz Potemkine Tavritchesky, of which the principal dimensions are: length between perpendiculars, 358 ft.; beam, 73 ft.; draught, 27 ft.; displacement, 12,480 tons, with 900 tons of coal and naphtha fuel. The thickness of armour is on the belt 9 in., casemates 6 in., turrets 10 in., deck 1–2½ in. Armament, four 12-in. (40 cal.) guns, ten 6-in. (45 cal.), sixteen 3-in., sixteen 1·8-in., fourteen 1·4-in. Q.-F., two 2½-in. Baranovsky guns, and five torpedo tubes. There are two triple-expansion engines of 10,600 H.P., to which steam is supplied by twenty-seven Belleville boilers. Speed, 17 knots. Coal endurance, 2650 miles. Complement, 638, including officers.

The list of battleships makes up a total of 191,322 tons and 184,928 I.H.P.

Coast-defence ships.

The coast-defence fleet consists of twenty-four ironclads, two of which—the Novgorod and Vice-Admiral Popoff—belong to the Black Sea Fleet. Only three ironclads on this list are of recent construction, viz., the Admiral Oushakoff, Admiral Seniavin, and General-Admiral Apraxine, built of steel, of 4126 tons displacement, and 16 knots speed. The remaining ships all date from the first shipbuilding period of the Russian steam Navy, and were constructed for the defence of St. Petersburg. They may be divided into two classes, according to their displacement. The first class comprises the four Admirals, Lazareff, Greig, Chitchagoff, and Spiridoff, of 3505 tons; and the Pervenetz, Netron Menia, and Kreml, old broadside frigates (floating batteries), commissioned usually as training vessels in the gunnery training division. They are of 3500–4300 tons displacement, and have a moderate speed. The second class comprises the Smertch, Charodeika, Uragan, Tifon, Streletz, Edinorog, Bronenosetz, Latnik, Lava, Perun, Veshtchun, Koldun, old iron monitors of 1565 tons and 6–8 knots speed, each armed with two 9-in. breach-loading guns and small quick-firing guns. They are to be utilised exclusively for coast defence.

First-class cruisers.

The list of completed first-class cruisers includes the Rossia (12,195 tons), Rurik (10,933 tons)—two armoured cruisers power-

fully armed, and with great radius of action; the Svetlana (3862 tons), a protected cruiser built in France at the Société des Forges et Chantiers de la Mediterranée, launched in 1896, and going through her trials; the Admiral Nahimoff (8524 tons), Pamiat Azova (6675 tons), Vladimir Monomach (6061 tons), Dmitri Donskoi (5882 tons), Admiral Korniloff (5817 tons), all of modern construction, armed with quick-firing guns, protected by armoured decks and side-belt (except the Admiral Korniloff), and with a speed of 16–18 knots. They are employed for service on the Pacific Station. The list is completed by the armoured cruisers Minin (6136 tons), Gerzog Edinburski (5050 tons), General-Admiral (4722 tons), Kniaz Pojarsky (5138 tons), built in 1867–78, usually commissioned as training vessels for foreign cruises, and by the Pamiat Mercuria, of 3000 tons, the only first-class cruiser * in the Black Sea Fleet.

Gromoboi.

In course of construction for the Baltic Fleet are: the Gromoboi, of the Rossia type, but a little enlarged, and the Diana, with her two sister ships, Pallada and Aurora, protected cruisers of 6630 tons and 11,610 indicated horse-power, which are being built at the new Admiralty Yard, and will be all fitted with three propellers and water-tube boilers of the Belleville pattern. The dimensions of the Gromoboi are: length, 473 ft.; beam, 68 ft. 6 in.; draught, 26 ft.; displacement, 12,336 tons. Armament, four 8-in., sixteen 6-in., six 4·7-in., fourteen 3-in., twenty 1·8-in., sixteen 1·4-in., and two Baranovsky Q.-F. guns, and five torpedo tubes. The thickness of the belt armour is 6 in.

Smaller cruisers.

Of smaller cruisers, Russia possesses the Rynda (3508 tons), Asia (2500 tons), Afrika (2590 tons), Kreisser (1653 tons), the Strelok (1334 tons), and her sister ships, the Djigit, Naiezdnik, Rasboinik, Plastun, Vestnik, and Zabiaka, all on the list of the Baltic Fleet.

Torpedo gunboats.

There are nine torpedo gunboats, viz., Lieutenant Ilyen (714 tons), Voevoda (448 tons), Posadnik (462 tons), and Abrek (535 tons), in the Baltic Fleet; Captain Saken (742 tons), Kazarski (400 tons), and Griden (400 tons), in the Black Sea; and Vsadnik (400 tons), Gaidamak (404 tons), in the Siberian Squadron. They are all good sea-going vessels, and have a speed of 21–22 knots.

Gunboats.

Of the twenty-seven gunboats, five in the Baltic Fleet may be mentioned, these being the Grosjashtchy, Gremiashtchy, Otvajny, Khrabry, all good sea-keeping gunboats for distant foreign stations, of 1492 tons and 14 knots, and the Giliak, 963 tons and 12 knots, recently launched, and intended for service in Chinese waters. The remaining gunboats in the Baltic are coast-defence gunboats, which, with the two in the Caspian Sea, have no fighting value, all being

* Russian classification.

obsolete, slow in speed, with very bad sea-keeping qualities. Other sea-going gunboats of this class are the Mandjur (1416 tons), Coreetz (1214 tons), Bobr (950 tons), Sivutch (1134 tons), in the Siberian Squadron, and six in the Black Sea, of 1224 tons, viz., the Donetz, Chernomoretz, Teretz, Kubanetz, Uraletz, and Zaporojetz.

Ineffective ships.

On the list of the Navy are the following vessels of no fighting value: fourteen special service and despatch vessels, six Imperial yachts, including the Standart, of 5557 tons, 11,330 horse-power, and 21½ knots speed, and Poliarnaya Zvezda, of 4100 tons and 17 knots, and, lastly, twenty transports and seven training-ships.

Torpedo-boat flotilla.

The torpedo-boat flotilla comprises the following classes: destroyers, first-class sea-going torpedo-boats, and second-class torpedo-boats. There are completed one destroyer—the Sokol, of 220 tons and 29 knots; 35 first-class, 77 second-class boats in the Baltic; 22 first-class, 11 second-class boats in the Black Sea, and 7 first-class and 7 second-class boats in the Siberian Squadron. At the present time there are under construction four destroyers of the Sokol type, and eight sea-going torpedo-boats, of 120 tons, 2000 horse-power, and 21 knots speed, the cost of each of the latter being £17,000. Besides these, four sea-going torpedo-boats are being built for the Siberian "equipage."

Auxiliary cruisers.

To complete my description of the Naval forces of Russia, I must mention the so-called Volunteer Fleet, which has been established in order that the merchant service may be auxiliary to the Navy in time of war. This company is subsidised by the Government, and has the fastest Russian merchant-ships afloat, the first of which were bought out of sums raised by a national subscription. The administration is in the hands of a special Board, presided over by a Rear-Admiral, and having its principal office in St. Petersburg. At the present time there are thirteen on the list, utilised in time of peace as transports for troops, and for the conveyance of passengers, goods, and war *matériel* from the ports of the Black Sea to Vladivostok, which can in time of war be easily armed, and used for doing the work of cruisers. They are the Kherson (10,225 tons, 19·5 knots), St. Petersburg (9282 tons, 19 knots), Saratov (8556 tons, 18¾ knots), Orel (7990 tons, 19¼ knots), Vladimir, Voronej, Ekaterinoslav, and Kieff, of 10,500 tons and 13 knots, and five others, the Kostroma, Nijni Novgorod, Yaroslav, Tamboff, and Habarovsk, varying from 7880 to 8640 tons, except the last (2500 tons), and steaming about 13 knots. To these in a short time will be added the Moskva, of 11,660 tons and 20 knots, at present building. Besides the Volunteer Fleet there is the Russian Company of Steam Navigation and Commerce, the largest of the steam navigation companies in Russia, having on its list

a large number of steamers, some of which could be utilised in time of war.

Fleet in commission. Baltic.

The following training squadrons and divisions are annually commissioned in the Baltic Sea: the Practice Squadron, the training division of the Naval Cadets Corps, the gunnery training division, and the torpedo training division. The Practice Squadron is commissioned every year for four months. The squadron includes the two divisions of the Baltic Fleet by turns, more especially the ships destined to fight an enemy that has entered the Baltic. To the battleships are added from eight to twelve sea-going torpedo-boats. The squadron as constituted for the summer of 1898 will consist of the following vessels:—armourclads Peter Veliky, Admiral Oushakoff, Admiral Seniavine, Admiral Greig, Admiral Chitchagoff; gunboat Khrabry; torpedo cruisers Abrek, Voevoda; despatch vessel Ilmen; destroyer Sokol; and ten sea-going torpedo-boats. The main purpose of the cruise of the Practice Squadron is the training and drilling of the *personnel* in all branches of seamanship, and to make the officers acquainted with the coast of the Baltic Sea and Gulf of Finland. The squadron is usually commissioned in the beginning of May and paid off in the beginning of September. The admiral in command of the squadron is one of the two admirals commanding divisions at Cronstadt. The staff consists of the same naval officers who constitute the shore staff of the division. The *personnel* of the Practice Squadron numbers 2426 officers and men.

A flotilla of eight torpedo-boats, with the steamer Slavianka for the commanding officer, is annually commissioned for a three months' cruise for the purpose of training the crews of torpedo-boats. This flotilla is also employed in the exploration of the coast of Finland out of the fairways.

The gunnery training division is commissioned every year for four months, and is usually stationed the whole time at the roadstead of Revel, busy with target practice. It consists of the Netron Menia, Pervenetz, Kreml, Admiral Lazareff, and gunboat Groza.

We have already mentioned the training division of the Cadet corps and the torpedo training division. In 1898 the first will consist of the Kniaz Pojarsky, Rynda, Voin, Verny, Moriak, and the second of the Afrika, cruiser; Europa, transport; Lieutenant Ilyen, torpedo cruiser; Mina, torpedo-gunboat; three sea-going torpedo-boats, and five second-class torpedo-boats. The torpedo division stays the whole summer at Transund, near Viborg.

There will be commissioned besides for different purposes a "block ship" with divers, a division consisting of the Snieg gunboat and four torpedo-boats to give training to the pupils of the Marine

Technical School; a cruiser, General-Admiral, with the stokers and engine-room artificers' pupils; and several vessels for surveying service.

In commission for steam trials and experiments there will be a division under a rear-admiral consisting of the following vessels:—battleships Poltava, Petropavlosk, Sevastopol; coast-defence ironclad General-Admiral Apraxin; cruiser Svetlana; two destroyers of the Sokol type, and ten sea-going torpedo-boats.

Black Sea. In the Black Sea an evolutionary squadron is annually commissioned for training the crews for a period of four months. It is an important guarantee of readiness for war that the climatic conditions of the Black Sea allow of some of the warships of this fleet being kept during the winter in partial commission. In this latter case they are included in the fleet reserve, and are maintained in such a degree of readiness for war that they could go to sea in sixty hours. The squadron in 1898 will consist of the battleships Tchesma, Ekaterina II., Tri Sviatitelia, Georgy Pobiedonosetz, Dvenadsat Apostoloff; cruiser Pamiat Merkuria; torpedo cruisers Captain Saken, Griden, Kazarsky; transport Dunai; and nineteen sea-going torpedo-boats. In commission for her machinery trials will be the Rostislav, and in reserve will be the Sinope. Besides these the list of commissioned vessels includes several training ships and vessels for special service.

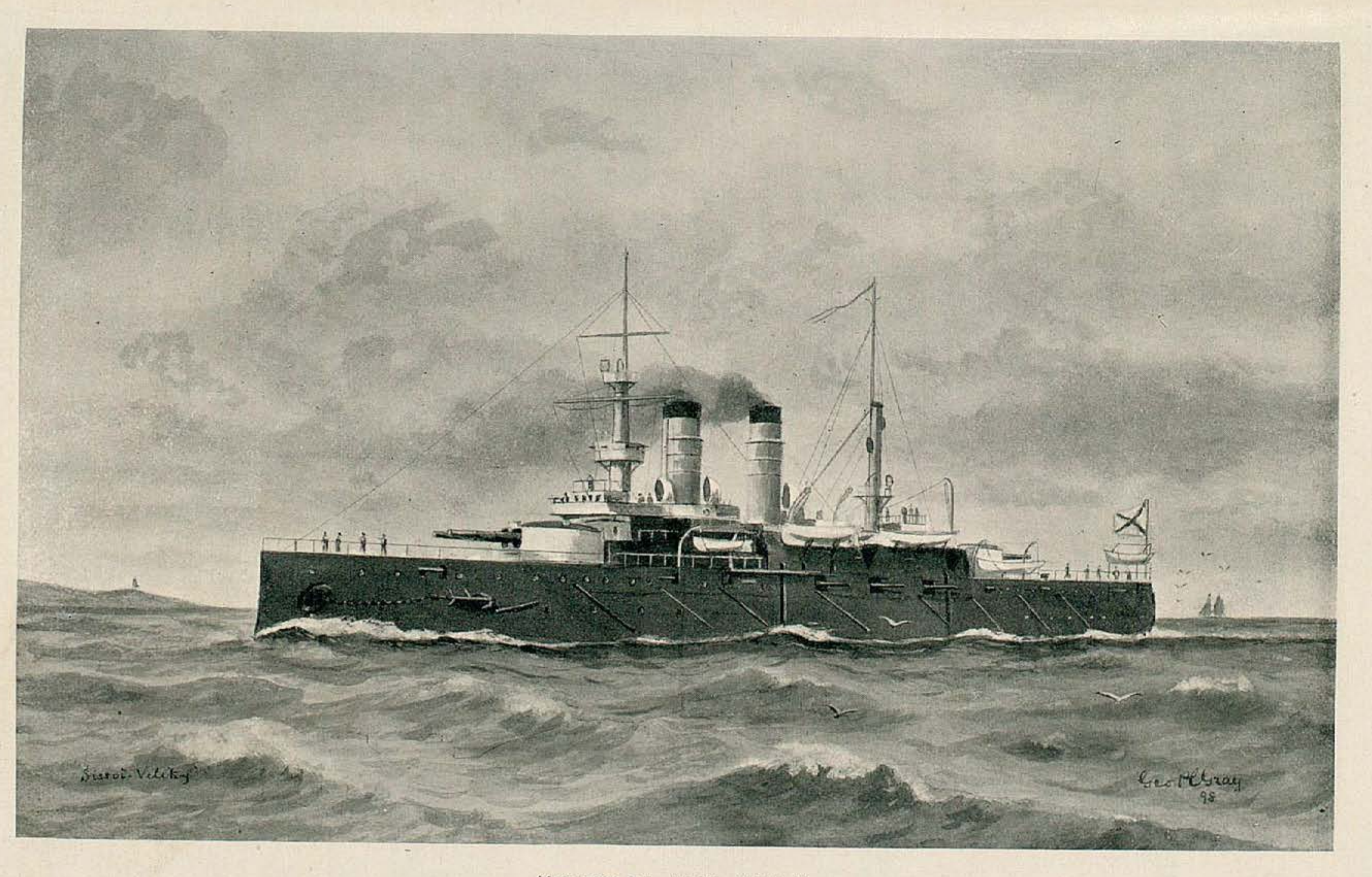
In the Caspian Sea vessels of the Caspian flotilla are commissioned as guardships at Baku and Astrabad, and act as pilot boats.

For fishery protection in the White Sea a cruiser is sent every year. The Bakan, which has been told off for the year 1898, will leave Revel early in the spring for a ten months' cruise in the Arctic Ocean and White Sea. She will also carry out surveying work on our polar coasts.

In all there will be afloat on commissioned vessels in home waters, 1183 officers, 276 engineers, 108 surgeons, 158 civil grades, 28 chaplains, 556 midshipmen and cadets, and 21,400 men.

Foreign stations. The Naval forces that Russia keeps in commission abroad comprise: a squadron in the Pacific, a division in the Mediterranean, vessels attached to foreign stations, and a certain number employed for training, special service, and protection of fisheries.

Pacific. The most important group is the Pacific squadron, which consists of some vessels of the Baltic Fleet and the Siberian "equipage." At present it includes the battleships Navarin and Sissoi Veliky, the first-class cruisers Rossia, Rurik, Pamiat Azova, Admiral Korniloff, Dmitry Donskoi, Admiral Nahimoff, Vladimir Monomach; the second-class cruisers Kreisser, Zabiaka; the gunboats Gremiastchy,



"SISSOI VELIKY,"

RUSSIAN BATTLESHIP.

Otvajny, Coreetz, Mandjur, Sivutch, Bobr; torpedo gunboats Vsadnik, Gaidamak; transport Jakut.

The squadron is under the command of a rear-admiral, whose staff is similar to that of the Admiral of the Baltic Practice Squadron. During the period from the 1st May till the 1st October the squadron is stationed at Vladivostock, where all repairs are carried out, making short cruises along the Siberian coast in order to train the crew in exercises that cannot be carried out in foreign waters, and to acquaint the officers with our Pacific stations and ports. The rest of the year the squadron is in Japanese and Chinese waters, and small vessels are told off to visit the ports of Tiensin, Hankou, and Fuchow, which are the principal centres of the Russian tea trade. The transport Jakut also cruises to the Commodore Islands for the protection of the seal fisheries.

The Mediterranean division, under a rear-admiral, consists of the battleships Emperor Alexander II., Emperor Nicolai I.; gunboats Grosjastchy, Uraletz; torpedo-gunboat Posadnik and two sea-going torpedo-boats. The Navarin and Sissoi Veliky have recently been sent to the Pacific. **Mediterranean.**

Besides these, the second-class cruiser Djigit is in commission in the Mediterranean, and the first-class cruiser Gerzog Edinbursky in the Atlantic, as training-ships for petty officers of the Black Sea and Baltic Fleets respectively.

There are only two foreign stations to which vessels are permanently attached. They are three vessels of small displacement at the disposal of the Ambassador, two of which (the gunboat Teretz and the steamer Kolhida) stay permanently at Constantinople, and the third, the transport Psesuappe, comes every year from the Black Sea to the Danube and stays at Galatz for six months.

The following further changes will be made in the course of this year. The Rasboinik, second-class cruiser, will replace in the Pacific squadron the Admiral Nahimoff, and the Giliak, a gunboat recently launched, will be added to the squadron. In the Mediterranean the Donetz will replace the Uraletz, and the battleship Emperor Nicolai I. has been ordered home. **Changes in 1893.**

In all there are afloat on foreign stations 409 officers, 100 engineers, 46 surgeons, 55 civil grades, 11 chaplains, and 10,400 men.

Shipbuilding in the Dockyards.

The two principal Naval dockyards, at St. Petersburg and Nicolaieff, invite special attention and examination in consequence of their great importance as building yards, while those of Cronstadt and **Dockyards**

Vladivostock are only repairing and fitting out yards. In the city of St. Petersburg there are two Government dockyards: the New Admiralty, and the Galerny Island, both under the supervision of the captain of the port, who is a vice-admiral. The first is employed both as a building and repairing yard, while the second is smaller and is exclusively a building yard. In order to increase the resources for the construction of modern battleships with a displacement of 14,000 tons, two new stone building slips and two machine shops have been erected at a cost of over £200,000. A special building, with a basin 400 ft. in length, has been erected for experiments with models of vessels, in order to obtain data for the construction of ships. The yards contain five building slips, two of which are on the Galerny Island, numerous workshops, store-houses and other buildings. Since 1885 there have been built at this dockyard the battleships Emperor Alexander II., Gangut, Poltava, Petropavlosk, Sevastopol.

Baltic Works.

Besides the Imperial dockyards, the Ministry of Marine has at the mouth of the Neva, for the construction of hulls of ships and large marine engines, a yard known as the Baltic Shipbuilding and Engineering Works, established in 1863 by a private person and shortly afterwards bought by a company. In 1894, on account of financial difficulties, the Ministry of Marine, which owned most of the shares, liquidated the affairs of the company, and the yard became the property of the Department. Since that time the dockyard has been enlarged, the new stone building slip of 520 ft. in length, which cost the Government £70,000, has been finished, and numerous new buildings have been erected. The administration of the establishment was put in the hands of a constructor of the Imperial Navy, and the most powerful cruisers of the Russian Navy, including the Rossia, Rurik, Pamiat Azova, and many others, have been built there. Shipbuilding has been carried on with unprecedented rapidity; for instance, the training-ship Verny, laid down in May, 1895, was launched in November of the same year, and in May, 1896, was commissioned in the training division. The first-class cruiser Rossia, launched April 30th, 1896, was completed and ready for foreign service in the autumn of 1897.

Private yards.

There are no private yards in Russia for building large war vessels except the Black Sea Company at Nicolaieff, all warships being built at the Government dockyards, except a few cruisers and yachts built by foreign firms. The most important of the private firms is the Creyton Works at Abo in Finland, which has built the torpedo-cruiser Abrek, of 535 tons, and several torpedo-boats.

Cronstadt.

The dockyard at Cronstadt is the principal arsenal supplying the

Baltic Fleet with stores of all kinds, and is especially used for repairs. There are numerous workshops, store-houses, and magazines, all within the dockyard, which covers 1,000,000 square yards, and there are four dry docks, viz., the Alexandrovsky, 584 ft. long and 85 ft. wide, large enough for the longest ship of the Baltic Fleet, the Constantinovsky, 490 ft. long and 73 ft. wide, the Nikolaievsky and the Petrovsky. Among the different establishments within the dockyard worthy of mention are the steam factories, the depôt of the Whitehead torpedoes, and the torpedo workshops, where the first torpedoes were constructed in 1880.

The capacity of the dockyards may be judged from the following table:—

Dockyards.	Output about.	Number of days of work during the year.	Average number of workmen employed.	Average pay.
	£		about	Roub. Kop.
St. Petersburg Government Dock	600,000	278	3570	1 2
Baltic Works	800,000	279	7250	1 14
Cronstadt Dockyard . .	500,000	277	3830	1 5

There is a fine new dry dock at Vladivostock, which was opened last October, 550 ft. in length and 90 ft. wide. The efforts to make the port accessible all the year round are so far successful.

The port of the Emperor Alexander III., near Libau, is being constructed as an advanced base for the Navy in that part of the Baltic Sea which does not freeze. The port proper consists of an outer port, a military port, and merchant harbour. The outer port occupies an area of one-and-a-half square miles, and is destined exclusively for ships completed. There is a basin 400 fathoms in length and 120 fathoms wide, for ships completing, surrounded by store-houses, workshops, barracks, and other buildings. Close to this basin is another 410 fathoms in length and 100 fathoms wide, with dry docks and workshops for repairs. The two basins are connected with the outer port by a canal about a mile and a quarter long. The town lies between the basins and sea-shore. Between the town and the basins the Naval hospital will be placed, and the powder magazines to the north of the basins amidst a forest. Only the north jetty and the breakwaters are at present completed. In 1895 the dry docks and buildings were begun, and their completion is expected in 1900. Recent events in the Far East have demonstrated the importance of being able to send vessels to sea all the year round;

Libau.

and makes the strategical value of Libau to Russian imperial policy clear.

Manufacturing establishments.

Among the Government manufactories working for the Navy are the Admiralty Ijora Works, which date from 1718, and now provide all materials for shipbuilding, prepare armour plates, and construct engines, boilers, and torpedoes. In all the manufactory turns out work exceeding £600,000 in value, and employs about 4000 men.

The Obuhoff Steel Works belong to the Ministry of Marine, and are situated on the Neva. They were established in 1863, and at present provide the Navy with guns of all patterns, armour plates, turrets, torpedoes, engine shafts, and other big castings. For the quality of guns made in the foundry, the Obuhoff Works stand high, and merit praise because not one of the thousands of guns made at these works has ever burst. The magnitude of its resources may be judged by the fact that 750 guns of different calibres are in hand at one time. Raw material comes mostly from the Ural manufactories, the Satkine works alone supplying the foundry with 4200 tons of cast iron. The number of men employed is about 3000, the daily pay varying from 50 kopecks to 3 roubles 50 kopecks. There is a school at the foundry with a three-years' course for 180 persons and 240 children of both sexes, as well as a hospital.

Besides the above, we may mention the Putiloff steel works; the Baranovsky manufactory, preparing all parts of Q.-F. Baranovsky and Hotchkiss guns, the Alexandrovsky steel works, the Haimovitch manufactory, which supplies the Navy with powder cases, and the Lessner manufactory, which manufactures torpedoes and torpedo-tubes.

Notwithstanding that the cost of a ship is greater in Russia than if ordered abroad, the majority of the vessels mentioned, as will be seen by the tables in Part II. of the *Annual*, are built in Russia, and we have only had recourse to foreign firms for armour and machinery in cases of imperative necessity, either when our dockyards and manufactories were too fully employed to be able to satisfy the requirements of the Navy, or when we wanted to procure a specimen of a very fast vessel or of a new type. The comparatively high prices that the Admiralty has to pay for the construction of ships and engines can be explained by the scarcity of large private dockyards and manufactories, and consequently by the absence of competition. The attention of the Admiralty has always been directed to reducing orders to foreign firms and to the encouragement of our own manufactories. In shipbuilding we have already reached independence, and will soon be able to provide the required quantity

of armour. The Ijora works alone can produce at present 3000 tons annually.

Navy Estimates.

The total sum allotted to the Ministry of Marine for the year 1898 is over £7,000,000 (for details see Part IV.), or about £850,000 more than the Estimates of last year. The principal items which refer to Naval construction proper are as follows:—Hulls of ships, £467,604; machinery, £730,104; armour, £52,291; reserve fund of ship-building, £4217. Total, £1,254,216, or including guns, torpedoes, and electric light, £2,120,603. This sum is to be devoted to the following new vessels, under construction and to be laid down during the year: First-class cruiser Gromoboi; battleships Oslabia Rostislav, Kniaz Potemkine; twenty-eight destroyers of the Sokol type. The following items may also be interesting. For the port of Vladivostock during the years of 1898–1902 there will be spent, outside the Navy Estimates, £1,614,000, about £300,000 of which will be spent in 1898. For the port of Libau there was spent up to 1897, £899,599; there is to be spent during 1898 £385,981. The list of new works to be undertaken during the current year include two dry docks, ten barracks for 1000 men each, twenty buildings for officers, etc.

A. Stroumillo,
Lieut., Russian Imperial Navy.

CHAPTER V.

The Manning of the Navy in time of War.

In the *Naval Annual* for 1895 a detailed estimate was given of the numbers required to man the ships then built and building. The conclusion arrived at was: "To man every effective ship will require, three years hence, not less than 95,000 men, or, allowing 5 per cent. for sickness and casualties, 100,000 men." As the complements of ships are now given in the alphabetical list in Part II., it is unnecessary to give a detailed estimate of what our requirements will be three years from the present time. Owing mainly to the fact that the first-class battleships built and building will require 28,000 men as compared with 18,800 men, and the first-class cruisers 22,000 as compared with 17,200 men in 1895, the numbers necessary to man the Navy three years hence cannot be estimated at less than 110,000 men, allowing no margin for non-effectives. Of the total numbers voted for the Navy last year, under 90,000 were available for sea service on January 1st, 1898. The strength of the Naval Reserve, including officers, was 27,000.

Power of creating new fleet. These numbers must be pronounced without hesitation insufficient for the war requirements of the Navy, especially when we take into consideration the fact that we do not only need men to man all available ships on the outbreak of war, with a certain margin for non-effectives and for wastage. One of our greatest sources of national strength lies in the private shipbuilding yards. In spite of recent developments in the United States, in Germany, in Russia and elsewhere, our output of new ships remains beyond comparison greater than those of any other country. In a period of from two to three years we could practically create a new fleet. Our private yards are capable of constructing from twenty to twenty-five battleships, and eighty cruisers, besides destroyers, torpedo boats, etc., at one time. Many of the smaller vessels could be completed within a year, most of the cruisers, and some of the battleships, could be completed within two years, and the remainder within three years.*

War will be prolonged. Why, it may be said, should we take these resources into consideration, when war will be over before we have time to utilise

* *Cf.* Chapter IX.

them? It is often asserted that a modern Naval war can last but a few months, with about the same amount of probability as that war will be suddenly declared without any previous intimation whatever. It is hard to discover any solid basis for such an assertion, unless it be assumed that our Navy is so weak that we shall be beaten at sea. We may not be so strong as we should wish, but we are still in a position to hold our own against any two foreign powers. Supposing us to be involved in war with either France or Germany or both, they are only vulnerable to us in their commerce or oversea possessions; but the loss of their sea-borne trade or of their colonies would not bring France or Germany to their knees. On the other hand, our commerce, which is absolutely vital to our existence, cannot be seriously interrupted until we are beaten at sea. The strength of our Army would prevent us invading France or Germany, the strength of our Navy prevents them from invading us. Neither side could deal its adversary such a blow as to make it sue for peace. We are in a somewhat different position as regards Russia and the United States, because with both we have a conterminous land frontier. India might possibly be invaded by Russia, Canada might be invaded by the United States. We are therefore more vulnerable by either Russia or the United States than we are by France or Germany. On the other hand, they are less vulnerable by us, because they have no oversea possessions. The loss of their export trade would be a serious blow to both Russia and the United States, but it does not follow that they would be unable to maintain the struggle. An invasion of either the United States or of Russia by us can hardly be contemplated. The conclusion from this brief review of the contingencies of warfare between Britain and the leading Naval powers of the world is, that so long as we hold our command of the sea neither side would be able to deal the other a vital blow, and that, therefore, the war is likely to be prolonged—giving ample opportunity for bringing into play the shipbuilding resources at our command.

Strongest reason for Reserve.

On the declaration of war between ourselves and any important Naval power or powers, the Admiralty will at once ask the House of Commons for a vote of credit to enable them to utilise our shipbuilding resources to their utmost capacity. How the House of Commons will deal with the request may be judged from the fact that £10,000,000 was voted without discussion during the Russian Scare of 1885. But the power of constructing ships rapidly will be useless unless we know whence to draw the men to man the ships when built, and herein lies the strongest reason for a Naval Reserve adequate both in numbers and efficiency.

Increase of permanent force.

Steps have been taken to secure efficiency,* but no serious attempt has been made to increase the numbers of the Naval Reserve. That Naval policy has been concentrated on increasing the permanent force is shown by the large and continuous increase in the total numbers voted for the Navy for ten years past. The numbers were :—

In	
1888–89	62,400
1889–90	65,400
1890–91	68,800
1891–92	71,000
1892–93	74,100
1893–94	76,700
1894–95	83,400
1895–96	88,850
1896–97	93,750
1897–98	100,050
1898–99	106,390

In the year 1888 there were 19·051 officers and men in the Naval Reserve. For the current year the strength of the force stands at about 27,000. Thus, while over 40,000 men have been added to the permanent force, only 8000 have been added to the Reserve. Mr. Goschen has stated in the House of Commons, in replying to a motion by Sir Charles Dilke, that with the 100,000 men voted for the Navy in 1897–8, and an addition of 6300 next year, the permanent force would have reached a standard beyond which it would be impolitic to go in maintaining men on the active list under the colours or at sea in time of peace. While deprecating this further increase, partly on the ground of cost, partly because every addition to the permanent force makes it harder to train the Naval Reserve, it is satisfactory to note the recognition that there must be some finality to the costly policy we have been pursuing.

Numbers required for Reserve.

All writers who contemplate seriously depending on a Reserve for the war requirements of the Navy place the figure at over 50,000 men. Lord Charles Beresford, in a recent article in the *Nineteenth Century*, says: "We require a Reserve of at least 70,000 officers and men." In previous numbers of the *Naval Annual* and elsewhere we have urged that the Reserves should be raised to 75,000 men. We require 50,000 men beyond the number necessary to make up the complements of ships available at the outbreak of war, to replace losses and to utilise the shipbuilding resources to which we have alluded above.

Sources of supply.

At the risk of wearying our readers we must again discuss in these pages the various sources of the supply from which the Naval Reserve men may be drawn in the numbers suggested. That the development of the seamen and marine pensioners reserve is desirable goes with-

* For summary *cf.* p. 107.

out saying, and need not be discussed here. Apart from this the three sources of supply are the Mercantile Marine, the Fishing Population, and the Colonies.

Mercantile marine.

In the Mercantile Marine the number of British seamen is diminishing year by year, and unless steps are taken to prevent it will diminish still more rapidly in the future. In the return issued last year of the number, ages, ratings, and nationalities of seamen employed on March 25th, 1896, on vessels registered under Part I. of the Merchant Shipping Act, 1894, there occurs the following significant table showing the total number of sailors (*i.e.*, able seamen, sailors, undefined and ordinary seamen) and boys in trading vessels in the different age periods in each of the years 1891 and 1896:—

Age.	Number employed on April 5, 1891.			Number employed on March 25, 1896.			Increase (+) or Decrease (−).		
	British.	Foreign.	Total.	British.	Foreign.	Total.	British.	Foreign.	Total.
Under 15 . . .	321	16	337	119	6	125	− 202	− 10	− 212
15 and under 20 .	6,688	659	7,347	4,616	855	5,471	−2,072	+ 196	−1,876
20 and under 25 .	10,949	3,807	14,756	9,242	4,214	13,456	−1,707	+ 407	−1,300
25 and under 30 .	7,207	3,363	10,570	6,567	3,513	10,080	− 640	+ 150	− 490
30 and under 35 .	5,009	2,144	7,153	4,380	2,174	6,554	− 629	+ 30	− 599
35 and under 40 .	3,707	1,364	5,071	3,279	1,570	4,849	− 428	+ 206	− 222
40 and under 45 .	2,845	943	3,788	2,608	916	3,524	− 237	− 27	− 264
45 and under 50 .	2,339	631	2,970	1,991	686	2,677	− 348	+ 55	− 293
50 and upwards .	2,401	345	2,746	2,124	352	2,476	− 277	+ 7	− 270
Not stated . .	124	160	284	94	183	277	− 30	+ 30	− 7
Total . .	41,590	13,432	55,022	35,020	14,469	49,489	−6,570	+1,037	−5,533

"From these figures it would appear," Mr. Clark Hall remarks, "that the falling-off in these ratings occurs mainly among the young British seamen, as boatswains, quartermasters, who are chiefly recruited from the 'sailor ratings,' and as 'sailors' do not ordinarily enter the sea-service after they are twenty-five years of age, this falling-off in the number of young British sailors affects the source of supply of our future petty officers and older able seamen."

Numbers of British seamen.

The seamen of all ratings (including masters, engineers, stewards, &c., &c.) employed on the 25th March, 1896, were drawn from the different countries as follows:—

British Islands	115,824
British (not otherwise defined)	4,368
Colonies	4,621
Foreign Countries	27,446
Born at Sea, &c.	196
Lascars on Asiatic agreement	27,911
	180,366

From the Board of Trade Return (C 8491) dated April, 1897, it appears that the total number of persons employed on vessels registered under Parts I. and IV. of the Act employed some time during the year 1896, including 21,993 fishermen in vessels registered under Part I., was 242,039, of whom 33,046 were foreigners and 29,999 Lascars. These figures, as pointed out by Mr. Gibson Bowles in his letter to the *Times* of November 1st, exclude :—

1. Vessels known to be trading abroad.
2. British vessels employed on rivers and inland navigation.
3. British yachts.
4. British undecked fishing-boats fishing within 3 miles of low-water mark.

Difficulty of British boys getting to sea.

The reason why the number of British seamen is diminishing year by year is not far to seek. It is exceedingly difficult for a British boy to get to sea except as a fisherman. British sailing-ships do not as a rule carry "boys," as distinguished from apprentices, for whom their parents pay a considerable premium, and the "boys" carried in steamships certainly do not become "seamen." Of the truth of the first of these assertions I can give interesting evidence. During the autumn of 1896 two conferences were held at Government House, Melbourne, at which the masters of all the large sailing-ships then lying in the port were invited to be present, in order to discuss the manning of the Mercantile Marine. At the second of these conferences it was ascertained by direct inquiry that only seven boys were carried on the seventeen ships represented, and some of these were rated as "ordinary seamen." The truth of the second assertion is self-evident.* In these days of acute competition shipowners cannot afford to train "boys" for the seaman's profession, and they certainly cannot be expected to do so as long as there is an adequate supply of efficient seamen to man their ships. Leading shipowners have assured me that such a supply is forthcoming. Whether these seamen are Britishers, Scandinavians, or Dutchmen is of no concern to the shipowners as men of business, but it is of very vital interest to the nation.

State action.

If the present condition of the manning of the Mercantile Marine is a national question, it is the duty of the State to take action in the matter. On the other hand it must be admitted that the State would not be justified in training men for a particular profession unless it was to have some claim on the services of the men when trained. Is it possible to work out a scheme which will meet the case?

* Boys carried in steamships are employed on cleaning work, &c.; and in many cases are not even taught to steer.

Commander Caborne's scheme.

The outlines of a scheme were traced in a paper read by Commander Caborne, R.N.R., at the United Service Institution on January 29th, 1896. He proposed :—

That the Board of Trade should be furnished with funds out of the public purse, wherewith to annually apprentice a fixed number of lads not under the age of sixteen, selected for their medical fitness and respectability, to approved shipowners for a term of three years.

The sum to be paid should cover all expenses to which the shipowner would be liable, and an agreement, outside the scope of the indentures, should be entered into with the Government by the boys and their parents or guardians.

At the time of apprenticeship, the boys should be entered in the third class of the Royal Naval Reserve. Upon the expiration of their indentures, they should undergo three months' instruction on board one of the modern drill-ships; after which, they should be required to serve in the fleet for a period of twelve months, and then be sent to one of the schools for a course of gunnery.

On the completion of this course of training they would be in a position to earn their own living in the merchant service. For fifteen years from the age of twenty they would be liable for service in the Royal Naval Reserve. They would be eligible for pension upon the terms now granted to first-class men.

It would be most essential that considerable care should be exercised in selecting ships for the boys in the first instance, so that they would not at the outset of their career be exposed to the risk of losing respect for those in authority over them, and, by the character of their treatment, become disgusted with their calling.

Commander Caborne admits that his proposals would cost money. He contends that if we spent £250,000, or even £500,000 per annum in training seamen, it would be but a small sum compared with the gigantic interests at stake.

Attempt to put Lord Brassey's scheme into operation.

In recent numbers of the *Naval Annual* and in the *Nineteenth Century*, an old proposal of Lord Brassey in favour of a scheme of State-aided apprenticeship was revived with certain modifications. In the spring of 1897, with the view of testing by practical experiment whether it was possible to provide a supply of British seamen for the Mercantile Marine and the Royal Naval Reserve—on lines somewhat similar to those suggested by Lord Brassey and Commander Caborne—I made a provisional arrangement with Messrs. Devitt and Moore to carry eleven "boys" in one of their sailing-ships trading to Australia. The principal points in the scheme were as follows :—

1. Boys of about 16 years of age, the sons of respectable parents, and physically fit to be indentured to Messrs. Devitt & Moore for three years.

2. Premium to be paid Messrs. Devitt & Moore 30*l.*—10*l.* of which must be paid by the friends or parents of the boys, the balance by the promoter of the experiment.

3. The boys to be berthed separately from the crew, but to be messed as if they were part of the crew.

4. For the first year the boys to receive no pay; for the second year to receive 15*s.* a month; for the third year 30*s.* a month.

5. Messrs. Devitt & Moore will provide continuous employment, so that the boys are not turned adrift as soon as the vessel arrives in London.

6. At the age of 19 the boys to join the "seaman" class Royal Naval Reserve.

NOTE.—By the New Regulations all men joining the Royal Naval Reserve have to enter the "seaman" class, and have to serve for six months in the Navy during the first five years of their enrolment. On the completion of their six months in the Navy, they are, if satisfactorily reported upon, to be promoted to the "qualified seaman" class, thus earning a retaining fee of 6*l.* a year. But *before* they are taken for six months' training in the Navy, they must have served two years in the "seaman" class Royal

Naval Reserve, or, at any rate, have done two periods of twenty-eight days' drill, and passed as "trained men."

7. If these regulations are insisted upon by the Admiralty, the lads trained under the scheme would not be eligible for six months' training in the Navy till they were between 20 and 21 years of age.

8. They would be "qualified seamen" in the Royal Naval Reserve, and A.B.'s in the mercantile marine at or about the age of 21.

Difficulties.

The weak point in the scheme was the fact that the lads would be turned adrift to earn their own living during their twentieth and part of their twenty-first years, and I endeavoured to induce the Admiralty to so modify their regulations as to enable the lads to do their six months' training in the Navy on the completion of their indentures. My request received the sympathetic consideration of the Admiralty, as the following reply will show.

ADMIRALTY, S.W.
14th April, 1897.

DEAR MR. BRASSEY,

I have discussed with Admiral Seymour the proposals which you have made for facilitating the entry in the Royal Naval Reserve of certain youths whom you propose to apprentice to Messrs. Devitt & Moore.

As you are aware, there are difficulties in giving effect to your proposals which would create an exception to the general regulations only just promulgated on the subject of entry and training of seamen of the Royal Naval Reserve in the very first stage of their operation.

The proposals seem, however, to offer some advantages which might justify the Admiralty in endeavouring to meet your wishes to some extent.

The main features of your scheme, as amended, appear to be:—

(a) The entry in Messrs. Devitt's & Moore's sailing vessel (where they will be thoroughly trained in seamanship) of a limited number of apprentices who will be indentured for three years from the age of 16.

(b) On completion of their indentures, at the age of 19, these apprentices to be entered provisionally in the Seaman class of the Royal Naval Reserve under the following conditions:—

(c) The apprentices to be allowed to go through twenty-eight days' drill at a Royal Naval Reserve Battery during the third year of their apprenticeship before being entered in the Reserve.

(d) The apprentices on completing their indentures to be then allowed as seamen of the Royal Naval Reserve to proceed at once to a second period of drill at a Royal Naval Reserve Battery.

(e) On satisfactorily completing these two periods of drill, the young seamen to be confirmed in the rank of "Seaman" of the Royal Naval Reserve, and to be entered thereupon in the Royal Navy for six months' training, in order to qualify for the higher rank of "Qualified Seaman" of the Royal Naval Reserve.

The Admiralty accept (b) and (e) in part, but as regards (c) and (d) they are not prepared to allow what would be tantamount to permitting the entry of a seaman in the Royal Naval Reserve before the age of 19. This regulation has been hitherto constantly maintained, and while to allow of an exception in this case would lead to applications from other quarters for a similar indulgence, it is not evident that a corresponding benefit to the Royal Naval Reserve would result from the concession.*

But the Admiralty have no objection to allow these apprentices to go through the first of the two necessary periods of twenty-eight days' drill at a battery, within the year following the termination of their indentures, and the second period of drill immediately following the end of the first twelve months from the date of their enrolment as Seamen in the Royal Naval Reserve.

This will practically enable the apprentices to undergo the qualifying amount of drill, and if passed as "Trained Men" to be entered in the Reserve as "Qualified Seamen" within thirteen months from the date of the completion of their indentures.

---

* The age has been reduced from nineteen to eighteen years, and young men are now allowed to embark direct for six months' training as soon as they have completed their twenty-eight days' drill if favourably reported upon, instead of first serving for two years in the Reserve. *Cf.* First Lords.

I regret that the Admiralty cannot accept your proposals in their entirety, as I believe they have been framed with the view of benefiting the public service, but considering the advantages which the Royal Naval Reserve offers to seamen of the mercantile marine, many of whom, I may mention, though possessing certificates of masters and mates, continue to be enrolled in the Reserve, I hope that the year's delay will have little or no effect upon the success of your scheme.

Yours very truly,
George J. Goschen.

As it was useless to start the experiment, unless means could be provided which would ensure that these boys would join the Naval Reserve on the completion of their indentures, and as I was assured that a large proportion would endeavour to become officers —of whom there is already a plentiful supply—the experiment was for the time reluctantly abandoned.

Need for State action.

For a private individual to put into practical operation a scheme of this kind is well-nigh impossible, however willing he may be to sacrifice time and money to solve a great national question. The Government alone can deal with the matter effectively. To obviate the difficulties which have appeared above, the following seems to be a practical course:—Boys to be entered in the Naval Reserve *at the same time* as they are indentured for three years to the owners of selected sailing-ships under an engagement to serve for at least ten years in the Reserve after the completion of their apprenticeship. Premium to be £30, two-thirds payable by the Government, one-third by the parents, the latter to be reimbursed to the parents or lad on his joining the Navy for his six months' training. It must be remembered that sailing-ships are rapidly disappearing from the Mercantile Marine, and that anything that is to be done must be done shortly.

Conditions of employment at sea.

Whether the prospect of earning a retaining fee of £6 a year before they were twenty-one and a pension at the age of sixty would attract British lads in sufficient numbers into the Mercantile Marine and Naval Reserve may be questioned. The wages and conditions of employment at sea compare unfavourably with those of skilled workers ashore. For the latter they have immensely improved in the last fifty years. For the former they have improved, but not in the same degree. Wages in Liverpool on the Australian voyage were 50*s.* per month in 1850; they were at 55*s.* last year. The cheapening in the cost of food has gone into the pocket of the workman ashore; afloat it has gone into the pocket of the shipowner. After all, the great objection to the sailor's career is the want of continuous employment. The practice of discharging the crew at the conclusion of the voyage, often in a foreign port, is absolutely demoralising. To remedy this state of things is possibly outside the scope of Government action; but Government could do something to improve the tone of the

profession and make the merchant seaman's career more honourable than it is by the establishment of a scheme of State-aided apprenticeship such as has been suggested above, which would strengthen the connection between the Navy and the Mercantile Marine. The doctrine of "laissez-faire" has been abandoned as regards the workers ashore, who are far better able to protect themselves than the sailor.

Fishermen. The establishment of the second-class reserve Lord Brassey claims, in a recent article in the *Nineteenth Century*, to be the principal result of a lifelong experience as a yachtsman and of eighteen years passed in the House of Commons. To add largely to the number of Naval Reserve men in the Mercantile Marine would take time. For an immediate increase of the force we must turn first to the fishing population of the United Kingdom. Upwards of 100,000 men are employed in fishing vessels registered under Parts I. and IV. of the Merchant Shipping Act. Besides these there are large numbers of men employed in open fishing boats and in other ways,* who would form good material for the Naval Reserve. It does not seem unreasonable to estimate that 30,000 Reserve men could be drawn from this source.

The Colonies and the Navy. The refusal of the Admiralty to accede to the request of Mr. Napier and loan a ship to the Auckland Harbour Board for the purpose of training boys for the Royal Navy has been so severely commented upon, that a few remarks on the subject will not be out of place here. From an imperial point of view it is exceedingly desirable that arrangements should be made as soon as possible for recruiting in the colonies for both the Army and the Navy. In their present stage of development the colonies cannot make a monetary contribution to the general defence of the Empire which will substantially relieve the burden on the British taxpayer. Any substantial contribution would involve awkward questions as to the control of expenditure. On the other hand, they might assist us very materially with men. Regiments might be raised in Canada, South Africa and Australia, one of the battalions of which formed the depôt battalion in its own colony, whilst the other was serving in some other part of the Empire. If there were not sufficient boys forthcoming for the permanent force of the Navy at home, it might be possible to recruit for the Navy in Canada and Newfoundland. Nothing could have a greater effect in widening the colonial conception of responsibility in the matter of imperial defence than the fact that there were Canadians, Australians and South Africans serving side by side with Englishmen, Scotchmen and Irishmen in all corners of the world. The retired colonial sailor

* *Cf.* Mr. Bowles, p. 106.

or soldier would be the means of spreading amongst our fellow-subjects in the colonies a fuller and wider knowledge of the Empire, just as the British sailor or soldier does amongst the masses of the people at home.

The sooner the objections (official or other) to recruiting for the Navy or the Army in the Colonies can be overcome the better for the Empire, but it must be admitted that there are substantial grounds for the refusal to accede to Mr. Napier's request at the present moment. (1) There is no difficulty in recruiting as many boys as are required for the permanent force of the Navy at home, and a large proportion of the applicants for entry are rejected every year. (2) Australians can at present enter the Navy as officers or bluejackets on more favourable terms than Britishers. An Australian can enter the Navy as a cadet by passing a qualifying instead of a competitive examination. He can enter the Navy as a bluejacket with the option of leaving at the end of six months, the Admiralty undertaking, should he elect to complete his twelve years, that a reasonable period of his service should be passed on the Australian station. These privileges are not taken advantage of to any appreciable extent. (3) The idea of providing for naval defence by the establishment of *harbour* training ships is far too prevalent in the Colonies, if not at home.

The Colonies and Naval Reserve.

The question of raising a Reserve Force in the Colonies is a far simpler matter. The *Times*, in a leading article on the correspondence alluded to above, remarks: "Instead of establishing a direct relation between the Navy and the colonies in the matter of *personnel*, it may be more expedient in policy and administratively more convenient to aim at the same result by means of a Naval Reserve recruited in the colonies and periodically trained in the men-of-war attached to the station." The idea of recruiting for the Naval Reserve in the colonies was put forward in the *Naval Annual* for 1896. During the latter part of that year the writer had the opportunity of studying the question on the spot in Canada and Australia, and of discussing it with many colonial statesmen, with representatives of the Seamen's Union in New South Wales and South Australia, and with the Victorian Steamship Owners' Association. In no quarter has he found serious objection. The shipowners of Victoria assured him that they would give every facility to the men in their employ to perform their drills and would keep their berths open. A representative of the Seamen's Union took part in a deputation to the Commander-in-Chief of the Australian station in 1889, urging that opportunities should be given to seamen in the colonies to join the Naval Reserve.

Australian press opinions.

Three extracts from Australian newspapers may be quoted as showing that the question is still exciting considerable interest in that quarter of our Empire. The *Brisbane Courier*, in a leading article on June 30th, 1897, says:—"It is time that Australians should face the question of making a contribution to their own defence worthier of their growth and their undoubted future. Can we wonder that a great continent, protected as we are protected at present for an insignificant cash payment, should be shorn of its greatness in the eyes of the men who conduct the vast Naval affairs of Britain, and who know how much these involve in time and money? Does not the old idea that the Colonies are a weakness to the mother-country rest mainly on this, that she has to dissipate her forces to defend them? Surely in the great Naval Review of the Diamond Jubilee the moment has come for wiping out that reproach. The moment has come for adding to rather than taking from the parent's strength."

The same paper, July 24th, 1897, writes:—"Yet it is true that if we go on doing nothing more than making monetary contributions to the cost of our Naval defence, we shall sacrifice the self-reliance and the Naval spirit which have enriched the mother-country with a glorious history, and which will make our own history worthy of a British nation. Renew the agreement by all means, but let it be so modified as to admit of an intimate relationship with the development of our own Naval defence. Surely it is possible to make the Auxiliary Squadron and the proposed Federated Naval Reserve interdependent. As now, let the Imperial Government find the ships and the principal officers, and let the Colonies find the men and the money. So the Auxiliary Squadron would train the Reserve. How can you get fighting seamen unless they get their discipline and instruction on fighting ships? If it be replied that this combination of Squadron and Reserve would cost more money than is now spent on the two forces separately, we say that the combination will be worth far more than the additional outlay. In defence the really costly thing is inefficiency."

A leading article in the *Adelaide Register* on July 5, 1897, has the following: "When the renewal of the Naval agreement shall be discussed in Parliament, it will be well for our legislators to remember that, in the opinion of experienced Naval authorities, the arrangement promising the most satisfactory results would be the discontinuance of the subsidy and the substitution of trained Australian seamen for service in the fleet—payment in man-power instead of in specie. With our growth in sea traffic and in population we shall certainly need more sea defence. Under the present arrangement, in its necessary

developments, we shall have to pay more money for additional ships and for extra men, and in the ordinary course these would be brought from the other side of the globe. To import all their defence material would be scarcely consonant with the self-respecting traits of Australians, especially as their numbers are increasing so rapidly and their institutions expanding proportionately." . . . "Of course we owe our peaceful possession of this land to the grand Naval power of the motherland, and this obligation must continue for many years; but we should keep before us the double objective of helping to man our own Navy and eventually assisting in the maintenance of Britain's supremacy over the sea."

Opinion in Canada.

In Canada the idea has been warmly taken up. On December 14th, 1896, a memorial was forwarded to the Governor-General of Canada, by the Toronto branch of the Navy League, urging amongst other things the reform and extension of the Royal Naval Reserve so as to admit of the enrolment abroad of colonial seamen. This memorial was approved in substance by the Boards of Trade of most of the leading maritime cities of Canada, such as Halifax, Montreal, Charlotte Town (P.E.I.), Vancouver, and Victoria, British Columbia. The council of the British Empire League has recently, on the motion of Sir Robert Herbert, "commended to the early consideration of Her Majesty's Government the proposal, brought before this Council by the deputation of the British Empire League in Canada on July 12th last, that Colonial seamen should be enrolled in the Royal Naval Reserve." A proposal has been recently under the consideration of the Canadian Government to devote £55,000 a year to a ship for training Canadian Naval Reserve men.

Opportunity afforded by Jubilee.

The sentiment of loyalty evoked all over the Empire by the Jubilee afforded a splendid opportunity of laying the foundations of federal defence and of making the Naval Reserve a truly Imperial force—a force in which Canadians and Newfoundlanders, Afrikanders and Australians should serve side by side with and on the same conditions as Britishers. The importance of educating our colonial fellow-subjects to realise their common responsibility with us in the defence of the Empire can hardly be overestimated. There is too great a tendency in the Colonies even now to consider that their responsibility ceases with local defence. The *Australasian* recently remarked: "In Great Britain every seaport or fishing village is a nursery for the navy, and there is no reason why sailors, midshipmen, and medical officers should not be recruited from these shores to a far greater extent than they have hitherto been. The presence of friends and relatives on board Her Majesty's war-ships would be a living bond which would greatly enhance our interest in the Australian

Squadron." We wish the last words had been "in the Imperial Navy." Though the matter was urged on the attention of the public and of those in authority at the time of the Jubilee, the "present phase of the Naval system" proved an insurmountable objection, and a great opportunity was lost. It is the more incumbent on those who believe in the soundness of the policy to persist in their endeavours.

Material available.

That there is abundance of good material for the Naval Reserve in the Colonies is without question. The seamen and fishermen of Canada (including persons so familiar with the sea as to be at home upon it) number 70,000, those of Newfoundland are said to number 55,000, and those of Australasia were estimated by the most competent authorities I was able to consult at 5000. The seafaring population of the Cape is insignificant. Included in the Canadian returns are a large number of men employed in the salmon fisheries of British Columbia, who can hardly be described as seamen, and it may well be doubted whether the figure given for Newfoundland is not an exaggerated estimate. Considerable deductions may be made from the figures given above, and still there remains a body of upwards of 100,000 seamen and fishermen in the colonies from which the Naval Reserve might be recruited. The quality of the material leaves little to be desired. There are few finer seamen in the world than the men employed in the fisheries on the banks of Newfoundland. The high rates of pay (£5 a month, with extra pay for overtime) in Australia attract excellent seamen.

Bodies of Naval auxiliaries already exist in Australia as follows:—

Colony.	Force.	No. of Men.	Cost per annum.
			£
New South Wales . . .	Naval Brigade .	335	4,613
" " " . . .	" Artillery .	206	2,178
Queensland	" Brigade .	300	2,000
Victoria	" " .	151	1,500
South Australia	" Reserve .	150	1,500
" "	" Volunteers	15	150
Making a total of . .	. . . .	1,157	11,941

Lord Brassey, in the December number of the *Nineteenth Century*, remarks: "In Victoria the Naval Brigade could be largely increased if funds were available. In New South Wales the great majority are time-expired men-of-war's men."

The suggestion of Lieut. J. Biddlecombe, of the Victorian Navy,

in a recent article in the *United Service Magazine*, for the better utilisation of these forces, is well worthy of attention:—

"As a mode of bettering the present state of things, all the small colonial bodies, at present under various names, might be amalgamated with the Royal Naval Reserve, under one general policy. The importance of a body or Royal Naval Reserve so constituted, its *esprit de corps*, its unity of interests, with bases all over the world, would be very great. The uncertainty of the future which local government engenders, by changes in management, makes greatly against the efficiency of any force."

Principles on which Reserve should be recruited in Colonies.

Before leaving this branch of the subject it is as well to recapitulate the principles on which we advocate that the Naval Reserve should be recruited in the Colonies. First, it must be perfectly clear that the Colonial Reserveman is to be recruited on the same conditions as the Naval Reserveman entered at home, the most important being that he should be liable to service in H.M. ships in any part of the world, and should be under the control of the British Admiralty. He would, no doubt, in the first instance be employed to make up the crews of any ships in reserve on the station * to which he belongs; but unless he is liable to the above conditions, it would not be worth while to recruit a single man at the cost of the British taxpayer. Secondly, whether he does his preliminary drills in a harbour training ship or a shore-battery makes very little difference, but it is of vital importance that provision should be made for his going through his six months' training in the Navy in the seagoing ships attached to the Station. By relaxing these conditions to suit Colonial opinion we would raise more men, but we would certainly have a less efficient force.

Will present pay suffice?

Will the present pay and conditions of employment attract men to the Naval Reserve in the numbers contemplated in this paper? The remarks of the *Army and Navy Gazette* on this point are well worth quoting.

"Parliament has already sanctioned the expenditure of great sums upon the maintenance of an Army Reserve, and we therefore decline to believe that it would grudge any reasonable expenditure upon a sound reserve for the Navy. It will be seen that the highest retaining fee for the 'qualified seaman' is no more that £6 a year, whilst the small pension of £12 a year cannot be obtained until the Reserveman has reached an advanced age. If these inducements are

* Lord Charles Beresford, who has given much attention to this subject, says:—"Reserve ships should be laid up at Naval bases in the Colonies where Colonial Reserves could train on them, and together with the crews of obsolete ships on the station (kept in commission for economy) could man these reserve vessels in time of war."

really adequate there is no more to be said; but, unfortunately, there is ground for the opinion that they are insufficient to attract the best class of Reserveman. The fishermen upon whom the Admiralty are largely depending are able, at times, to earn good wages, and it is to be feared that the best and most intelligent of these men may not be attracted by a retaining fee of 10*s.* a month. To the future these men rarely look, and consequently a pension at sixty may appear vague and uncertain in early life. It is quite apparent from other clauses in the rules that the Admiralty wisely aim at filling up the Reserve with young men. No man, we understand, will be called out after fifty years of age, and consequently there can be only economic reasons for withholding the pension until ten years later. We are convinced that the Reserve would be far more likely to become popular with the seamen and fishermen alike if the Government would consent to confer a pension at an earlier age than sixty. This would doubtless involve much larger outlay, but a good Naval Reserve will have to be paid for at market value."

Improvement in pay, &c., necessary.

It is the writer's opinion that some additional British fishermen, and some Canadian and Newfoundland fishermen, can be induced to enter the Naval Reserve on the present terms, but that these will fail to attract Australian seamen. The supply of British seamen is becoming exhausted. To raise the Naval Reserve to a strength of 75,000 men, or even 50,000 men, the retaining fee should be increased to £10, and the pension should commence at an earlier age than sixty. The higher retaining fee should only be paid so long as the Reserveman continues to follow the sea as his profession, and might possibly not be paid during his first period of enrolment. The efficiency and attractiveness of the Reserve would certainly be increased if Reservemen with special aptitudes—for instance "good shots"—would be promoted to be "petty officers" and were thus able to earn an increased retaining fee and pension.

Cost of Reserve.

To carry out these suggestions would obviously increase the cost of the Naval Reserve. At present we obtain a force of some 27,000 officers and men at a cost of, in round figures, £250,000 (*cf.* Navy Estimates, Vote 7), or under £10 a head. The cost of the Reserve might be increased to £15 and even more per head—as would be the case when the pension charges came into full effect—and still would not compare with that of the permanent force, which cannot be taken at less than £80 per head, excluding the cost of Naval barracks, &c., provided under the Naval Works Act.

The manning proposals of the estimates for 1898–9 render it necessary to again urge that steps having been taken to secure efficiency, greater dependence should be placed on the Naval Reserve.

Our present policy is not only costly, but what is of much more importance, it fails to provide the number of men needed to man the Navy in time of war. It will also have the effect often alluded to in these pages of causing a decline in efficiency. To deal with the last point first, the First Lord tells us in his memorandum: "The number of boys passing out of the training ships having exceeded the number capable of being sent at once to sea-going ships, it has become necessary to make use of the Agincourt as a dêpot-ship for boys"—a step largely due, no doubt, to the undesirability of sending lads to the same dêpot-ships as seamen and stokers. But both this and a later statement in the memorandum that "the number" (of Naval Reserve men) "for which it is considered that accommodation can advantageously be found on board ships at one time is 600," point to the conclusion that in spite of the large addition to the number of ships in commission, it is becoming exceedingly difficult to give the men of the permanent force the necessary practice at sea. Secondly, during the present year 6000 men are to be added to the permanent force of the Navy, at the end of ten years we shall have 6000 men available for war service. In the same time and with the same number of ships in commission 60,000 Naval Reserve men could each have been given two periods of six months' training in the Navy, and at the end of the ten years we should have had 60,000 men available for war service. Thirdly, the ultimate annual cost of the addition of 6000 men to the permanent force will not be less than £500,000. For that sum 50,000 men at the present cost per head, and over 30,000 men, if the suggestions made above for increasing the attractiveness of the force were adopted, could have been added to the Naval Reserve. It may be admitted that the Reserve man would not be, at the outbreak of war, as efficient as the bluejacket, and yet there can be no comparison in the results attained. In considering the relative advantages of the two policies, it must be borne in mind that our main object is to secure adequate numbers of efficient men to man the Navy in time of war. The superior efficiency of the permanent force men will not compensate for the immense superiority of numbers which can be obtained by developing our Naval Reserves.

T. A. Brassey.

CHAPTER VI.

BRITISH NAVAL MANŒUVRES.

THE manœuvres of 1897 were unusually short and not very instructive. Two plans of operations were drawn up by the Admiralty to be carried out independently, one by the Channel Fleet and the other by the Reserve Fleet, each fleet being reinforced for the occasion by a large contingent of ships mobilised for the Jubilee Review at Spithead.

OPERATIONS OF CHANNEL FLEET.

The Channel Fleet was composed as follows:—

BATTLESHIPS.

1st Division.	*2nd Division.*
Majestic (flag).	Magnificent (flag).
Prince George.	Royal Sovereign.
Mars.	Resolution.
Jupiter.	Repulse.
Victorious.	Empress of India.
Renown.	

CRUISERS.

Powerful.	Blake.
Terrible.	Blenheim.
Naiad.	Charybdis.
Latona.	Hermione.
Thetis.	Spartan.
Tribune.	Sappho.
Sirius.	Andromache.
Terpsichore.	Magicienne.
Pelorus.	
Halcyon.	Speedy.

The First Division was commanded by Vice-Admiral Sir H. F. Stephenson, and the Second by Rear-Admiral Fellowes. The General Idea for the operations of the Channel Fleet was formulated as follows:—

GENERAL IDEA.

In anticipation of war a squadron (2nd Division) puts to sea from Blacksod Bay, leaving one cruiser behind to bring on the news that war has been declared.

This cruiser, under orders to proceed direct to a rendezvous at a fixed speed, is followed some hours after she has started by two cruisers of an opposing squadron (1st Division) with the object of discovering the position of the enemy-squadron and informing their own Admiral, who has put to sea from Lough Swilly, so as to enable him to prevent the return of that squadron to Blacksod Bay by intercepting it at sea.

Area of Manœuvres.—Within a circle of 350 miles radius drawn from Blacksod Bay, and bounded by the 52nd parallel of latitude and the 7th meridian of longitude.

Time of Operations.—90 hours from the declaration of war.

The following were the instructions issued to the Admirals in command:—

INSTRUCTIONS TO 1ST DIVISION.

The ships of the 1st Division will coal and prepare for the Manœuvres at Lough Swilly.

The 2nd Division will leave Blacksod Bay late on Wednesday afternoon the 7th July.

War will be declared at midnight on the 7th, and the remaining cruiser of the 2nd Division may be expected to leave Blacksod Bay immediately after that.

Two cruisers of the 1st Division may be sent to sea before noon on the 7th to take up positions 30 miles north and south of Blacksod Bay by the time that war has been declared.

They are not to follow the 2nd Division, nor the cruiser which leaves later, but are to remain near the coast until 4 A.M. of the 8th; when, if they have not sighted the 2nd Division cruiser, they are to proceed independently to search for her, steaming at the rate of 17 knots, and assuming that she has steered to the westward of them at a uniform rate of 12 knots an hour.

The cruiser, if sighted, will endeavour to escape, but if overtaken will give the rendezvous of the 2nd Division. If put out of action under the Rules she is to return to Blacksod Bay.

The Admiral of the 1st Division may send the remainder of his cruisers to sea when war is declared, and may himself leave with the Battle Squadron after noon of the 8th.

The Admiral of the 2nd Division, with his Battle Squadron, will wait for his cruiser, if she has not joined him before, from daylight of the 9th to daylight of the 10th, within 15 miles of the rendezvous, unless within that time he is warned by his cruisers of the near presence of the 1st Division Battle Squadron. Subject to these conditions he is to endeavour to evade the 1st Division and return to Blacksod Bay.

The 1st Division will have effected their object if the Battle Squadron has at any time got within 3 miles of the 2nd Division Battle Squadron before it has reached a point 10 miles from the entrance of its port.

No vessel can be captured nor battleship put out of action.

INSTRUCTIONS TO 2ND DIVISION.

The ships of the 2nd Division will coal and prepare for the Manœuvres at Blacksod Bay, and will put to sea after 4 P.M. of the 7th July, leaving one cruiser behind.

War will be declared at midnight of the 7th, after which the cruiser may leave to convey the news to the 2nd Division at the appointed rendezvous. She is to steer one straight course, and maintain a uniform speed of 12 knots an hour.

She will be searched for by two fast cruisers of the 1st Division, who will start at 4 A.M. from the coast on each side, north and south, of Blacksod Bay, and steam at the rate of 17 knots. If either of these is sighted and identified, the chased cruiser may endeavour to escape, but if overtaken she must give up the position of the rendezvous, and if put out of action under the Rules, she must return to Blacksod Bay.

The Admiral of the 2nd Division with his Battle Squadron must wait for his cruiser, if she has not joined him before, from daylight of the 9th to daylight of the 10th within 15 miles of the rendezvous, unless during that time he is warned by his cruisers of the near presence of the 1st Division Battle Squadron. Subject to these conditions he is to endeavour to evade the 1st Division and return to Blacksod Bay.

With the exception of the two cruisers sent to sea before noon of the 7th to take up their positions, the cruisers of the 1st Division cannot leave Lough Swilly before war is declared, and the Battle Squadron before noon of the 8th July.

No vessel can be captured, nor battleship put out of action.

The position of the rendezvous will be found in the sealed instructions to be opened after war is declared.

The Admiral of the 2nd Division will have gained his object if he can get to a point 10 miles from the entrance of Blacksod Bay before the 1st Division Battle Squadron has at any time been within 3 miles of his Battle Squadron.

A code of "Rules and Regulations to be observed during the

Manœuvres" was also issued to both fleets in common, and from this it will suffice to make the following extracts:—

The duration of "active operations" will extend from midnight of the 7th to 6 P.M. on the 11th July. No hostile act may take place except during those ninety hours. Vessels at sea before the 8th are merely out in preparation.

Battle Squadrons cannot be divided, and must be intact at the moment of carrying out their object.

The action assigned to cruisers is primarily, on the one side, to screen their Battle Squadron from observation, and, on the other side, to get touch with that Battle Squadron in spite of its cruisers, and communicate with their own Admiral.

These regulations were followed by a detailed definition of the terms on which cruisers could be put out of action, but as no cruiser was put out of action during the operations it is unnecessary to give it at length.

Characteristics of the operations.

The essential feature of the operations was the search for a cruiser at sea which had been ordered to leave a known anchorage at a time approximately known, and to steam at a known speed, namely 12 knots, in a direction only known to lie somewhere to the westward within an arc of approximately 180°. The Admiralty appear to have suggested, though not to have enjoined, that the search should be prosecuted according to the geometrical method of "The Curve of Search," * elaborated by two French writers of the "*jeune école*" in a work entitled *Essai de Stratégie Navale*, which was published a few years ago. With this view a paper was issued by the Admiralty which was headed "The Curve of Search," and contained "a short explanation of a method of conducting search on the open sea for an enemy whose speed is known, and whose position on the chart at a certain hour on a certain day has been ascertained." A consideration of this paper more properly belongs to the general subject of "Scouting," which is discussed in another chapter. It suffices to assume, for our present purpose, that in searching for a ship "whose speed is known, and whose position on the chart at a certain hour on a certain day has been ascertained," the best course for a pursuing ship of superior speed to take lies theoretically on a spiral curve, the elements of which are determined by the relative speeds of the two ships, and by their relative positions at starting. Further, that the search being, as in the case propounded, confined to an arc of 180° or less, this curve gradually converges towards what may be called the axis, that is, a line drawn from the centre of the arc which divides its circumference into two equal parts; so that if two ships engaged in the search start originally from positions equi-distant from the centre, their respective curves will at corresponding points be equi-distant from the axis, and will intersect at some point upon it. Theoretically, the escaping ship should be intercepted by

* *Cf.* p. 179, *et seq.*

one or other of the pursuing ships at some point or other of their respective curves, or, if her course lies exactly along the axis, she should encounter both her adversaries simultaneously at the point where their curves intersect, which may be conveniently designated the apex

Now in the operations under consideration, the centre of the arc was Blacksod Bay, and, subject to an ambiguity in the instructions which will be noted presently, the axis may be assumed to have lain in a direction due westward. From this position the escaping cruiser—the Blenheim—was to start at midnight between July 7 and 8, and shaping a course somewhere to the westward, was to proceed at a uniform speed of 12 knots. Her purpose was to convey to Admiral Fellowes, who, with the remainder of the Second Division, had left the same anchorage for an unknown rendezvous some hours previously, the news that war was declared at the hour at which she started. The First Division, under Admiral Stephenson, was at Lough Swilly, and his battleships were required to remain there until after noon on the 8th, that is, for twelve hours after war had been declared. But two of his cruisers—the Powerful and the Terrible were selected—might be sent to sea before noon on the 7th so as to take up positions respectively thirty miles north and thirty miles south of Blacksod Bay by the time that war was declared at the ensuing midnight, and at or after that time the remaining cruisers might put to sea at the discretion of Admiral Stephenson. The Powerful and Terrible were directed by the instructions "not to follow the Second Division nor the cruiser which left later, but *to remain near the coast* until 4 A.M. of the 8th, when, if they had not sighted the Second Division cruiser, they were to proceed independently to search for her, steaming at the rate of 17 knots."

Ambiguity in instructions.

But for an ambiguity in these instructions, the elements of the curves of search permissively assigned to the Powerful and Terrible might seem to be exactly determined. Black Rock, about ten miles due west of Blacksod Bay, might be taken as the centre of the arc of 180°, and the axis might be held to run due west from that point. But if the Powerful and Terrible were to be placed at the extremities of a line sixty miles long passing through Black Rock in a direction due north and south, one, the Powerful, in the north, would be some twenty miles from the nearest point of land in the neighbourhood of Erris Head; while the other, the Terrible, in the south, would be dangerously near the rocks in the neighbourhood of Ship Sound. On the other hand, the prescribed condition of "remaining near the coast" could be satisfied equally for both ships by placing them at the extremities of a line sixty miles long, running

through Black Rock, not due north and south, but some 25° east of north and west of south; in this case, however, the axis of the curve of search would be shifted the same number of degrees to the northward.

Strategic importance of the apex.

It would appear from the sequel that this displacement was not contemplated by the framers of the instructions. On the other hand the words which seemed to suggest it did not in any way affect the dispositions of Admiral Stephenson, who, for reasons which will be considered presently, framed his measures for the discovery of his adversary's rendezvous on lines practically independent of the curve of search. But, whether he employed it or not, the position of its apex was determined by the positions assigned to the Powerful and Terrible at the outset, and that position was one of immense strategic importance. It will be observed that the instructions contemplate two distinct alternatives—that of the Blenheim being overtaken by one cruiser alone which would be entitled to demand the rendezvous from her, but could not put her out of action, and thereby prevent her reaching the rendezvous; and that of her being put out of action by two cruisers, both of which must remain within a mile of her for seventy minutes. It was not, indeed, positively known to Admiral Stephenson that the Blenheim would be selected, but her selection or that of the Blake was the most probable, and in any case it was necessary to provide against it. Now the speed of the Blenheim is inferior to that of the Powerful and Terrible, and perhaps not more than equal to that of the Pelorus at her best; but it is appreciably superior to that of any of the other cruisers attached to the First Division. Hence she could only be put out of action according to the rules either by the Powerful and Terrible combined, or by one of them combined with the Pelorus, in conditions very favourable to the latter. It was possible for Admiral Stephenson to reinforce the Powerful by the Pelorus after a certain time had elapsed, but, owing to the greater distance, he could not so easily reinforce the Terrible in the same manner, nor could he effectively reinforce either by any other cruiser at his disposal. Thus there were three cruisers, and three only of the Second Division, any two of which, if in company when the Blenheim was sighted, could in favourable conditions put the latter out of action. But the speed of the Pelorus was insufficient for a prolonged chase at the extreme speed of the Blenheim; and it was, of course, only possible for the Powerful and Terrible to overtake the Blenheim and put her out of action if they sighted her in company, as they would do if the course of the Blenheim was directed along the axis of their curves of search. It was therefore probable that the contingency

contemplated by the instructions of the Blenheim being put out of action could only be effectively realised at the apex of the curves of search.

We have seen, however, that an ambiguity in the instructions, either accidental or designed, left the direction of the axis of the curve of search in some measure indeterminate. It might lie in a direction due west of Black Rock or in a direction some 25° to the northward. There were no other alternatives which would satisfy the conditions, and whichever of the two was selected by Admiral Stephenson as the more probable, it afforded a commanding position for the rendezvous of his division. It was centrally placed in regard to the field of operations, and in all probability nearer the enemy's port than the rendezvous of the latter, the distance of which from Blacksod Bay could be approximately determined at some 300 miles by the speed assigned to the Blenheim and the time allowed her for reaching it. He could reach it with his battle squadron within about twelve hours of the time at which the Powerful and Terrible would effect their junction there, and by a judicious employment of his cruisers in scouting he could have made certain of not missing them, and could therefore have obtained any information they had to give him at the earliest possible moment after their search was completed. If either had overtaken the Blenheim he would have learnt where the rendezvous of Admiral Fellowes was; if both had overtaken her and put her out of action he would know that Admiral Fellowes must remain within fifteen miles of that rendezvous until daylight on the morning of July 10th. Even if neither had sighted her he would still be centrally placed, with all his forces collected, and would be able to prosecute a further search for his adversary with the practical certainty that he was between the latter and his port of refuge.

Dispositions of Admiral Stephenson.

The strategy of Admiral Stephenson was, however, conceived on lines entirely different. He assumed that the position of the rendezvous assigned to Admiral Fellowes would be determined by the analogies of some historical precedent, and finding that the distance from Blacksod Bay to Lough Swilly was approximately equal to the distance from Brest to Plymouth, and that the rendezvous was somewhere to the westward of Blacksod Bay, within a radius of 350 miles, he persuaded himself that it would stand approximately in the same relation as regards bearing and distance to Blacksod Bay that Bantry Bay does to Brest. This would place it in the North Atlantic, in the neighbourhood of Rockall Bank. The conjecture was ingenious, but at the same time precarious. It certainly gave to the assumed dispositions of the Second Division

a strategic actuality which was conspicuous by its absence from the dispositions assigned to it by the Admiralty, for it must be acknowledged that to send an inferior squadron to sea, to assign it a rendezvous which bears no discernible relation to any known objective, and to order it to get back to its port, if it can, as soon as it finds a superior adversary on its traces, is a proceeding which finds no warrant in the analogies or even the probabilities of actual warfare. It staked the issue on a divination, which would have been brilliant if successful, but was after all only a divination, and not a reasoned result of the exclusion of other less likely alternatives. Nelson, however, often acted on divinations of the kind, and was sometimes misled by them; and perhaps Admiral Stephenson was content to be wrong with Nelson rather than right in defiance of all the analogies of warfare.

However this may be, all the dispositions of the First Division were based on the assumption that the rendezvous of the Second Division would be found in the neighbourhood of Rockall Bank. They need not be considered in much detail, because the assumption proved to be unfounded, and the dispositions based on it consequently led to no result. Leaving its anchorage at the appointed time, the whole division, with the exception of the Powerful, the Terrible, and the Pelorus, otherwise employed, shaped a course for the assumed rendezvous, opening out as its neighbourhood was reached, so as to sweep through it on a widely extended front. Nothing was found there. It was now the morning of the 9th, and, as no trace of the enemy had yet been discovered, course was shaped by the whole fleet for Blacksod Bay in the hope that he might be intercepted on his return. An extended front was still preserved, but as it was plain that the enemy was nowhere in the neighbourhood, it was not thought necessary to engage in systematic scouting.

Proceedings of Powerful, Terrible and Pelorus.

The assumption that the enemy's rendezvous was near Rockall Bank determined the course which, on that assumption, the Blenheim was certain to pursue. The same assumption determined the proceedings of the Powerful and the Terrible. The Powerful, temporarily reinforced by the Pelorus, which left Lough Swilly as soon as war was declared, was directed to pursue the northern curve of search, and to proceed towards its apex unless she had previously encountered the Blenheim. It was expected, however, that the Blenheim would be found at the point where a line drawn from Blacksod Bay to Rockall Bank intersected the Powerful's curve; and for this reason the Terrible was directed to abandon her curve of search, and to proceed at once to the point in question, where it was anticipated that she would join the Powerful in time for the two

together to put the Blenheim out of action. But the proposed combination proved a complete failure. The Blenheim never appeared on the scene at all, having taken an entirely different course. The Terrible, having had some trouble with her engines, reached the critical point an hour behindhand, and seeing nothing of the Powerful, proceeded forthwith to rejoin the flag. The Pelorus had rejoined previously as the fleet was leaving Lough Swilly, and reported that nothing had occurred up to the time when she parted company with the Powerful. The Terrible rejoined before dawn on the 9th with an equally featureless report, except that about 10.30 P.M. on the 7th she had seen five ships of the enemy in the neighbourhood of Blacksod Bay, but could not ascertain whether they were battleships or cruisers. The Powerful rejoined later in the course of the same morning after completing her search, but had nothing of importance to communicate. Early on the following morning, the 10th, she was again sent ahead to scout. About 9 A.M. she returned flying the signal for the enemy in sight, and reported that about 7 A.M. she had seen eight ships of the enemy about lat. 54° and long. 13°, apparently steering for Blacksod Bay.

Proceedings of Admiral Fellowes.

This was the first intelligence that Admiral Stephenson had received of the enemy, and it showed him that, if correct, he could only hope to intercept the enemy off Blacksod Bay by proceeding thither at full speed. The offing of Blacksod Bay was reached about noon, but no trace of the enemy was found, and a cruiser despatched to reconnoitre the anchorage returned with the information that it was vacant. About 8 A.M. on the following morning, the 11th, the Second Division appeared in the offing, and the First Division forthwith proceeded at full speed to meet it, clearing for action as it went. Admiral Fellowes, however, pursued the even tenour of his way, and made no similar preparations.

Meeting of Fleets.

The somewhat farcical sequel is, perhaps, best recorded in the signals interchanged between the two Admirals. The first signal came from Admiral Fellowes, and was not made until after Admiral Stephenson had fired a gun to indicate that, in his opinion, he had gained the advantage by preventing the return of Admiral Fellowes to his port in accordance with the regulations. Then Admiral Fellowes spoke: "This is our third visit to Blacksod Bay during the cruise. Favoured by fortune, the cruiser conveying intelligence of war being declared was enabled to reach me. On receipt of the news I made for Blacksod Bay, and arrived there about noon on the 9th, not a very difficult task, everything in favour. I reported my arrival by telegraph to the Admiralty. In reply, I was ordered, in case I had not been to rendezvous, to go to sea again and continue manœuvres.

Having, however, accomplished our part successfully, I respectfully submit that we are no longer enemies, but once again the Second Division of your squadron, and delighted to rejoin your flag." This signal was surprising rather than satisfying. The answer to it was as follows: "What was your rendezvous? . . . My cruiser sighted you yesterday morning in about lat. 54° N., long. 13° W." Reply: "Rendezvous, 54° 10′ N., 18° 55′ W. I was about ninety miles from it when cruiser gave me intelligence. We also saw your cruiser." A few minutes later this reply was supplemented as follows: "I should have added that Admiralty in telegram directed me to go West 200 miles. I was on my way there when your cruiser was sighted."

Situation considered.

These signals speak for themselves, but their singular character will be more fully displayed by comparing the information they convey with the instructions issued by the Admiralty. The rendezvous assigned to Admiral Fellowes was some 300 miles due west of Blacksod Bay. Steaming at only 10 knots he could have reached it in thirty hours. Therefore if he had started as late as 6 P.M. on the afternoon of 7th July, he could easily have reached it at midnight between 8th and 9th July. He never reached it at all. He was overtaken by the Blenheim ninety miles short of it. The Blenheim steaming at 12 knots would reach this point in rather less than eighteen hours, and rather more than eighteen hours later Admiral Fellowes was back in Blacksod Bay from a point which it had taken him at least twenty-four hours to reach. If he could return in eighteen hours he could of course have gone out in eighteen hours, and if he held himself entitled to proceed towards his rendezvous with less than ordinary despatch, there is no reason why he should not equally have held himself entitled to proceed at the slowest possible speed so as to ensure his being overtaken by the Blenheim within a short distance of Blacksod Bay. But there was a very good reason why Admiral Fellowes might desire to be overtaken by the Blenheim at the point where she actually joined him. This point was close to the apex of the curve of search which started from a base running north and south through Black Rock; so that if Admiral Stephenson should happen to have traced his curve from this base, not only would the capture of the Blenheim by the Powerful and Terrible have been frustrated, but those ships must themselves have fallen into the trap. If this conjuncture was accidental, Admiral Fellowes was indeed singularly "favoured by fortune," as he said himself; if it was designed, his ingenuity in interpreting the rules to his own advantage positively beggars comment. The rules were perhaps ambiguous. "The Admiral of the Second Division with his Battle Squadron must

wait for his cruiser, *if she has not joined him before*, from daylight of the 9th to daylight of the 10th within fifteen miles of the rendezvous, unless within that time he is warned by his cruisers of the near presence of the First Division Battle Squadron. *Subject to these conditions* he is to endeavour to evade the First Division." As the battleships could easily have reached the rendezvous at or before midnight between the 8th and 9th, and as the Blenheim could not reach it until an hour later, it seems probable, not to say certain, that the words "if she has not joined him before" were meant to apply to no other place than the rendezvous and its neighbourhood, and to no other time than that between 1 A.M. and daylight on the 9th. It must be assumed however that they were taken by Admiral Fellowes to apply not merely to the rendezvous but to any other place at which the cruiser might join him, and particularly to the place ninety miles short of the rendezvous at which she did actually join him. In that case of course they would have applied equally to a position not more than fifty or sixty miles from Blacksod Bay, a conclusion which is only admissible on the assumption that the Admiralty had taken leave of their senses. It is not perhaps possible to contend that the interpretation adopted by Admiral Fellowes was inconsistent with the letter of his instructions. It is on the other hand quite impossible to reconcile it with their spirit. What the Admiralty thought of it is sufficiently shown by their promptly directing Admiral Fellowes to put to sea again *and continue the manœuvres* by proceeding 200 miles to the westward. How in the face of this direction he could claim in the final issue to have "accomplished our part successfully," it passes the wit of man to understand.

How Admiral Fellowes employed his cruisers.

It only remains to consider the use made by Admiral Fellowes of his cruisers. The rules directed him to employ them "primarily . . . to screen their battle squadron from observation." This plain and unambiguous direction was interpreted by Admiral Fellowes to be consistent with their almost exclusive employment in furnishing an escort for the Blenheim. The five ships sighted by the Terrible, at 10.30 P.M. on July 7, in the neighbourhood of Blacksod Bay, were subsequently ascertained to be five cruisers told off to await the Blenheim, and escort her towards the rendezvous. Two others were employed to proceed along the curves of search conjecturally assigned to the Powerful and the Terrible, and to mislead the latter if they happened to come across them. It has never been explained how these dispositions were reconciled with the plain letter, to say nothing of the spirit, of the rules, and perhaps it was never pretended that they could be. Manifestly the purpose of the Admiralty was that the Blenheim should be unaccompanied—

"leaving *one* cruiser behind" were the words employed—until she had passed beyond the *rayon* of search assigned to her immediate adversaries, and that the remainder of the Second Division should proceed to an assigned rendezvous with such despatch that it could not be overtaken by the Blenheim before its arrival there. Apparently the purpose of Admiral Fellowes was quite different. He must have wished to show how easily rules could be interpreted in a non-natural sense, and how safely they could be ignored when no such interpretation was possible. He found one loophole in the rules, and slipped through it with an agility to the manner born. He made another, and drove through it with the proverbial momentum of a coach and six.

General reflections.

It is nevertheless greatly to be regretted that schemes of manœuvres framed by the Admiralty should often be so loosely worded, and explicit regulations for their conduct sometimes so feebly enforced, as almost to encourage these curious antics. Ambiguities in the rules seem to affect different Admirals in quite different ways. Sometimes they perplex them so sorely as to hamper their judgment, curtail their legitimate discretion, and enfeeble their initiative. At others they seem to inspire a disposition to cut the knot instead of patiently untying it, and even to sever the string where no knot can be found, merely because it imposes an obviously intended but still irksome restraint. Both results are not a little calculated to impair the value of the lessons to be learnt from manœuvres skilfully devised and loyally executed. For the one a sufficient remedy is to be found in common sense, and a habit of using the English language with precision. Few Admirals read rules or interpret them in the spirit of a sea-lawyer. For such as do, however, it would seem to be necessary not merely to frame the rules with common sense and precision, but to submit them for final settlement to the smartest of *nisi prius* attorneys.

The Reserve Fleet.

The operations of the Reserve Fleet were quite independent of those of the Channel Fleet, and conceived on entirely different lines. The fleet was composed as follows:—

Battleships.

1st Division.	*2nd Division.*
Alexandra (flag).	Sans Pareil (flag).
Benbow.	Edinburgh.
Howe.	Thunderer.
Collingwood.	Warspite.
Devastation.	Aurora.
Colossus.	

CRUISERS.

Australia.	Galatea.
Venus.	Dido.
Diana.	Juno.
Isis.	Doris.
Melampus.	Mersey.
Apollo.	Leander.
Æolus.	Brilliant.
Phaeton.	Hazard.
Antelope.	

The First Division was commanded by Vice-Admiral Compton E. Domvile, and the Second Division by Rear-Admiral H. L. Pearson. The "General Idea" of the operations was formulated in the following terms:— Scheme of operations.

News having been received that a hostile squadron (2nd Division) has been ordered to be at one of two rendezvous on a certain date with the object of making a sudden descent from the nearest of them on Berehaven or Falmouth, as may be decided at the last moment by the Admiral, and it having transpired not only that both rendezvous are equidistant from Brow Head, in Ireland, and over 100 miles apart, but that one is as far from the Fastnet Rock as the other is from St. Mary's, Scilly—

The Defence Squadron (1st Division) is ordered to put to sea from Milford Haven, and endeavour to intercept it before it can reach either port.

Area of Manœuvres.—Within a circle of 220 miles radius drawn from the Fastnet Rock and bounded to the north by the 52nd parallel.

Time of Operations.—90 hours from the declaration of war.

The following more detailed instructions were issued severally to each Division:—

INSTRUCTIONS TO 1ST DIVISION.

The ships of the 1st Division will coal and prepare for the Manœuvres at Milford Haven. War will be declared at midnight on Wednesday, the 7th July, and active operations will continue till 6 P.M. on the 11th.

After war is declared the cruisers of the 1st Division may leave Milford in search of the 2nd Division, but the Battle Squadron may not leave until midnight of the 8th July.

The 2nd Division will leave Berehaven on Wednesday afternoon, the 7th. The Admiral has permission to be outside the area of the Manœuvre field for one period of twenty-four hours, where he can be followed by the cruisers of the 1st Division, but his instructions compel him to pass through one of the rendezvous at midnight of the 10th July before the descent on one of the ports given in the General Idea is attempted.

No vessel can be captured nor battleship put out of action.

The Admiral of the 1st Division will have gained his object if his Battle Squadron can get within 3 miles of the 2nd Division Battle Squadron at any time before it has reached a point 10 miles from one of the two ports.

INSTRUCTIONS TO 2ND DIVISION.

The ships of the 2nd Division will coal and prepare for the Manœuvres at Berehaven.

Being in all respects ready, they will put to sea after 4 P.M. on Wednesday afternoon, the 7th July.

War will be declared at midnight of the 7th, and active operations will continue till 6 P.M. on the 11th.

The Admiral in Command is to make such disposition of his battleships and cruisers as he thinks best to avoid being found; he may be outside the area of the Manœuvre field for one period of twenty-four hours, where he can be followed by the cruisers of the 1st Division, but he must pass through one of the rendezvous at midnight of the 10th before he can make the descent on one of the ports given in the General Idea.

The cruisers of the 1st Division can only leave Milford Haven after war is declared, and the Battle Squadron only after midnight of the 8th.

No vessel can be captured nor battleship put out of action.

The 2nd Division will have gained its object if it avoids being intercepted at sea by the Battle Squadron of the 1st Division; that is, if it can reach a point 10 miles from one of the ports given in the General Idea, before the 1st Division has, at any time, been within 3 miles of it.

The positions of the rendezvous will be found in the sealed instructions to be opened after war is declared.

All other "Rules and Regulations" were common to both Fleets, and so far as they bore upon the actual proceedings they have already been quoted.

Scheme considered.

It will be seen at once that the "General Idea" embodied rather a geometrical exercise than a strategic problem, and it is perhaps to be regretted that it should have been propounded in terms which properly apply only to the latter. There is no conceivable strategic actuality in the statement that a hostile fleet has been ordered to be at a certain date at one of two rendezvous, the position of which is determined by purely geometrical conditions. The position of his rendezvous in time of war is a piece of information which no capable commander would, if he could possibly help it, allow to come to his enemy's knowledge; and even if it were extorted from him by capture it is quite certain that it would be found to be defined not by fantastic geometrical conditions, but by the commonplace indications of a definite latitude and longitude. It is still more to be regretted that the problem, such as it was, should have been propounded in terms ungrammatical in form and far from intelligible in substance. The Admiral of the First Division was required to find within an arc of a circle of 220 miles radius drawn from the Fastnet Rock, and bounded to the north by the 52nd parallel, two rendezvous which satisfied the following conditions:—

1. Both were to be equidistant from Brow Head.
2. *Both* were to be over one hundred miles apart—whatever that may mean.
3. One was to be as far from the Fastnet as the other was from St. Mary's, Scilly.

It is obvious that every possible pair of rendezvous would lie on some circle having its centre at Brow Head, with a *minimum* radius of about half the distance between Brow Head and St. Mary's, that is, about seventy-five miles, and with a *maximum* radius of approximately 220 miles—because Brow Head being only some seven miles from the Fastnet, a circle drawn from Brow Head as a centre and with a radius of much more than 220 miles would lie wholly without the area assigned to the manœuvre field. Now if a line be drawn from Brow Head to St. Mary's and

another line, which may conveniently be called the axial line, be drawn at right angles through the middle point of the former, it can be mathematically deduced from the distances and other data involved that the one of each pair of possible rendezvous which is defined by its distance from St. Mary's will be found in the neighbourhood of the axial line, and at a distance from it of not more than one-twentieth of the distance of the same rendezvous from Brow Head. It can further be shown that the whole of this series of rendezvous lies within a narrow belt contiguous to the axial line. This line runs approximately north-east and south-west. The width of the belt at its northern extremity is about twelve miles; where it crosses the line joining Brow Head and St. Mary's its width is less than eight miles; and at its southern extremity its width is about twenty-two miles.* No position on this belt appears to afford a shorter course to Falmouth than to Berehaven, and the rendezvous complementary to those lying within the belt all lie either to the westward of it, and therefore still nearer to Berehaven, or so near to Milford Haven as to be practically excluded from consideration. The rendezvous complementary to those lying within the belt can be determined by successively taking positions within the belt, ascertaining their several distances from St. Mary's, and marking corresponding positions in accordance with the conditions relating to Brow Head and the Fastnet, each over 100 miles from the rendezvous within the belt with which it corresponds.

So far it was not difficult for Admiral Domvile to determine the possible pairs of rendezvous from which one pair would be selected and assigned to Admiral Pearson in his sealed orders; and by eliminating all those which seemed, for various reasons, to be less likely to be selected than the rest, he was enabled to reduce to more Ambiguities in instructions.

* Draw a line B M from Brow Head to St. Mary's and another line B F from Brow Head to the Fastnet, and let P and P′ be two complementary rendezvous. Then if B represent Brow Head, M St. Mary's, and F the Fastnet, the conditions require that

$$\begin{aligned} PB &= P'B \\ \text{and } PM &= P'F \\ \therefore PB \sim PM &= P'B \sim P'F; \end{aligned}$$

and it can readily be shown that P′ B ~ P′ F cannot be greater than B F; that is, the difference between the distances of P from Brow Head and St. Mary's cannot be greater than the distance of Brow Head from the Fastnet. If P B ~ P M were always equal to B F, P would always lie upon one of the two branches of a hyperbola, drawn with its foci at B and M, and symmetrically disposed towards the axial line as defined above. But as P B ~ P M may be less, and cannot be greater, than B F, P may lie between the two branches of the hyperbola, but cannot lie outside them. The numerical data given in the text are deduced from these conditions and from the known distances of Brow Head from the Fastnet and from St. Mary's respectively. For practical purposes the asymptotes of the hyperbola would sufficiently define the belt, and in that case its width would be reduced to zero at the middle point of the line joining Brow Head to St. Mary's. As the area of search was not a complete circle, many points within the belt would be practically excluded from consideration.

or less manageable dimensions the area within which he might expect to find his adversary at the date assigned in the instructions. But it was far more difficult—indeed, it might almost be said to be impossible—for him to determine what his adversary might be expected to do or even what he was required to do by his instructions in the event of his being discovered and his rendezvous ascertained. He knew from the General Idea that Admiral Pearson "had been ordered to be at one of two rendezvous on a certain date with the object of making a sudden descent from the nearest of them on Berehaven or Falmouth, as may be decided at the last moment by the Admiral." But it is quite impossible to interpret language so loose as this, and to say with any certainty what is meant by "the last moment" —whether it means the moment of arrival at the rendezvous chosen or the latest moment at which the choice between the two rendezvous still remains open. If the latter, its meaning could have no significance for Admiral Domvile, and could afford him no guidance, because, from the nature of the case, up to and at that moment the choice between the two alternatives could not be denied to Admiral Pearson, unless it had been determined by the Admiralty beforehand, in which case the words are not only redundant but misleading. If on the other hand it means the former, this meaning introduces a fresh series of uncertainties. Until this initial difficulty is resolved it is impossible to say what the Admiral is to decide at the last moment—whether in the second alternative he is to decide which of the two rendezvous he will choose, or whether in the first, having previously chosen one of the two, and arrived at it, he is then to decide whether from that one he will go to Falmouth or to Berehaven. It is further impossible to say with any certainty what is even the meaning, to say nothing of the intention, of the words, "with the object of making a sudden descent from the nearest of them on Berehaven or Falmouth." Nearest to what? No probable rendezvous of the whole series appears to have been nearer, in a nautical sense, to Falmouth than it was to Berehaven, though one of each pair was further from Berehaven than the other. Can it possibly be that Admiral Pearson was intended to go to Falmouth if the rendezvous chosen by him was further from Berehaven than its fellow, and to Berehaven in the other alternative? If so, it must be acknowledged that the language chosen to express this comparatively simple meaning was deplorably ungrammatical and ambiguous. Expressed in plain English the more probable meaning of the whole scheme appears to be this: "A hostile squadron is at large. It has been ordered to be at one of two rendezvous on a certain date. These two rendezvous

are equi-distant from Brow Head, and over 100 miles apart. One is as far from Fastnet as the other is from St. Mary's, Scilly. It is not to be expected that the choice between these two rendezvous will be made by the Admiral until the last moment at which it remains open. One of the rendezvous is nearer to Berehaven than the other. If the latter is chosen it may be assumed that a descent will be made on Falmouth; if the former is chosen it may be assumed that a descent will be made on Berehaven. In these circumstances the Defence Squadron is ordered to put to sea, and endeavour to intercept the enemy before he has accomplished his purpose."

These are no captious criticisms. The meaning assigned above to the General Idea as propounded by the Admiralty only derives its greater probability from the known result of the operations and not from any decisive indication afforded by language which, strictly speaking, has no determinate meaning whatever. It is known from the result that the two rendezvous indicated in the sealed instructions were situated respectively in lat. 50° 21′ N., long. 13° 14′ W., and lat. 48° 48′ N., long. 10° W. It is also known that Admiral Pearson chose the latter, and that from there he went to Falmouth, although the rendezvous chosen lies nearer to Berehaven than it does to Falmouth, but not so near to Berehaven as the alternative rendezvous not chosen. It seems probable, therefore, that Admiral Pearson held, rightly or wrongly, that the choice he was required to make "at the last moment" lay between the two alternative rendezvous and not between the two alternative points of attack; that he interpreted "the last moment" to mean the last moment at which the choice he was required to make still lay open and not the moment at which he reached his rendezvous; and that having chosen that one of the two rendezvous assigned to him which lay further from Berehaven than the other, he held himself bound for that reason to make his descent on Falmouth. In other words, he interpreted the General Idea in the sense assigned to it above. But he might have interpreted it at every point in exactly the opposite sense, and in particular he might, without doing violence to a single letter of the instructions, have gone from the rendezvous he chose to Berehaven instead of to Falmouth on the ground that that rendezvous was, in the language of the General Idea, "nearest" to Berehaven, or, as strict grammar would require, nearer to Berehaven than to Falmouth. Both these courses being equally open to Admiral Pearson, it is evident that Admiral Domvile could not possibly tell from any knowledge in his possession or from any indication he could gather from the instructions which course his adversary would pursue. If this was the intention of the Admiralty, there is of course nothing

more to be said; if it was not, regret must again be expressed that the intentions of the Admiralty could not be stated in good grammar and plain English. As has been said above, ambiguities of the kind here criticised only serve to perplex and paralyse the judgment of officers who strive to make the best of them, while they implant in others an irresistible impulse to make the most and the worst of them.

Actual course of operations.

However, it appears from the issue that both Admirals interpreted the General Idea in the same sense and in the sense given to it above. This was certainly not the only sense that could have been given to it, and it must be regarded as no more than a fortunate accident that both Admirals hit upon the same interpretation. The Second Division was instructed to put to sea late in the afternoon of 7th July, and to pass through one or other of the rendezvous indicated in the sealed orders to be opened after war was declared, at midnight between 10th July and 11th July. Between the time of leaving his port and that at which he was due at the rendezvous—a period of some seventy-eight hours—he was empowered to remain outside of the manœuvre field for one period of twenty-four hours. If he availed himself of this permission and was seen by any of the First Division cruisers to do so, those cruisers might follow him for the purpose of keeping touch with him, but apparently not otherwise—at least such would seem to be the meaning of the words common to both sets of instructions, "where he can be followed by the cruisers of the First Division"—but, as usual, the language is not very precise. It does not appear that Admiral Domvile availed himself of this permission, nor is it easy to see what end he could gain by doing so. The area to be searched by his cruisers was in any case so large that he must divide them into small groups and send each group in a different direction to scout in different parts of the region to be examined. Admiral Pearson, on the other hand, had no such occasion to disperse his cruisers, and by keeping them concentrated in company with his flag might always hope to be able to chase away a stray cruiser or small group of his adversaries, and by altering course as soon as the latter were driven beyond the range of observation to interrupt the touch they had established. Actuated no doubt by this consideration, Admiral Domvile appears to have decided not to attempt to search the whole area of the manœuvre field, but to concentrate his main attention on that narrower portion of it within which all the rendezvous likely to be assigned to Admiral Pearson were located. We have seen that none of these were very far to the eastward of the axial line above defined. The examination of the belt associated with this line was reserved in the main for his Battle Squadron, his principal rendezvous being in

the neighbourhood of its central position—that is, of the middle point of the line joining Brow Head to St. Mary's. The remaining portion of what was known as the dangerous zone—namely, the area containing all the probable rendezvous—was to be previously examined by three groups of cruisers; and in the event of their search proving fruitless, as it did, the three groups were gradually to close in on the southern and south-eastern portion of the dangerous zone and to search it thoroughly before dark on the 10th within such limits as considerations of time and distance showed to be those within which the enemy must be if he was anywhere in the neighbourhood—that is, anywhere so near to the southern extremity of the axial line as to sustain the presumption that he was making for one of the rendezvous associated with that line. The eastern area north of the central line had previously been searched and found vacant in the first instance by the Battle Squadron and subsequently by a cruiser told off for the purpose. On the evening of the 10th Admiral Domvile repaired to a rendezvous so located as to afford him a shorter course either to Berehaven or to Falmouth than any rendezvous likely to be assigned to the enemy would afford Admiral Pearson, and there awaited the course of events.

Dispositions of Admiral Domvile and their results.

By these dispositions, it was anticipated that betimes in the evening of the 10th it would be ascertained by the cruisers and reported to Admiral Domvile whether Admiral Pearson was or was not anywhere within the area searched in the afternoon by the cruisers. If he was, it was certain, according to the assumption made by Admiral Domvile as to the meaning of the instructions, though not perhaps according to their letter, that Falmouth would be his objective, because there would have been no time for him to reach any rendezvous more than 100 miles west of the axial line, and all the rendezvous in the neighbourhood of the axial line were, according to the same assumption, rendezvous from which a descent on Falmouth must be made. If, on the other hand, he was not found within the area of final search, it was almost equally certain for similar reasons that Berehaven would be his objective, and in that case, as soon as Admiral Domvile had ascertained Admiral Pearson's absence from the area of final search, he would endeavour to reach Berehaven in advance of him. There were some loopholes in the reasoning perhaps, but the dispositions of Admiral Domvile were probably the best that could be made with the limited force of cruisers available, and they effected their purpose. No sure trace of the enemy was discovered by any of the cruisers until the forenoon of the 10th, but it seems, on the other hand, that the First Division Battle Squadron was observed shortly after it had quitted Milford

by one of Admiral Pearson's cruisers. It was not, perhaps, to be expected that the earlier search of Admiral Domvile's cruisers would be successful, nor is it very likely that even if it had succeeded in establishing touch with the enemy, such touch could have been maintained for any practical purpose. If the enemy had been sighted in the earlier period of the operations, he would certainly have been in a position which bore no ascertainable relation to the rendezvous for which he would have to make at a later date, and as one cruiser out of a *maximum* group of three must then have been detached to carry intelligence to the flag, Admiral Pearson, by keeping his cruisers in hand, would always have them in sufficient force to chase the remaining two observing cruisers beyond the range of observation, and, having done so, would be free to alter his course without their knowledge. Besides having some eight hours' start in time and some 200 miles in distance, Admiral Pearson might count almost with certainty on getting outside the manœuvre field before he could be observed by the enemy, and unless they could observe him and follow him, it would appear that Admiral Domvile's cruisers were not empowered by the rules to quit the manœuvre field themselves—but this point is, as has already been observed, one of the ambiguities with which the rules abound. Having passed unobserved outside the manœuvre field, Admiral Pearson could thenceforth elude all observation for twenty-four hours, and, steaming round it, could re-enter it at the end of the period at a point at least 240 miles, measured along the circumference, from that at which he had quitted it. This will account for his position when he was first observed by one of Admiral Domvile's cruisers in the forenoon of the 10th. Suspicious lights, indicating a south-easterly course for the ships which displayed them, had previously been observed by the Australia, Venus, and Phaeton in the early morning of the 9th, but these lights were not followed up.

Discovery of the Second Division and measures taken to intercept it.

Soon after 9 P.M. on the 10th the Isis rejoined the flag of Admiral Domvile, and reported that at 10 A.M., in lat. 48° 15′ long. 7° 30′, she had sighted thirteen ships of the enemy standing to the westward. From the position here indicated it would not have been possible for Admiral Pearson to reach the more western of the two rendezvous assigned to him, which lay at a distance of over 200 miles, in the fourteen hours still remaining at his disposal. But Admiral Domvile was not acquainted with the position of this rendezvous, and as there were some of the western series of rendezvous which lay within reach of Admiral Pearson from the position in which he was observed at 10 A.M., the information obtained by the Isis did not enable Admiral Domvile to determine

whether the descent of Admiral Pearson was most likely to be made on Berehaven or upon Falmouth. An hour and a half later, however, at 10.30 P.M., the Æolus reported that at 3.15 P.M. she had sighted the enemy in lat. 48° 44′, long. 8° 10′, steering north-east, and that for an hour this course was maintained. This position is well to the eastward of the axial line, and the course indicated, compared with that previously observed, showed that Admiral Pearson was making for his rendezvous, wherever it was, by a devious course, and that therefore he was in no hurry to reach it, as he must have been in the afternoon of the 10th, if he was making for any rendezvous of the western series, all of which lay to the westward, and most of them a long way to the westward of the axial line. It was, therefore, practically certain that he was making for some rendezvous in the eastern series, and that in consequence his descent would be made on Falmouth; but it remains as uncertain as ever what was "the last moment" at which he decided and what it was that he decided at that moment. However, Admiral Domvile came to the conclusion—which, according to the sense in which he had read the instructions throughout, was irrefragable—that Falmouth was his adversary's objective. Accordingly collecting the remainder of his cruisers—all of which, with the exception of the Diana, rejoined about 11 P.M., but brought no further information of importance, except that the Diana, having had trouble with her engines, was not likely to rejoin, and might even be captured—he made with all necessary despatch for Falmouth, and having reached that port patrolled at a distance of 10 miles from it, in order that, when the enemy made his appearance, he might claim a victory in accordance with the rules. Owing to the fortunate accident that both Admirals read their very obscure and ambiguous instructions in the same sense, this claim was substantiated; but the irony of the whole situation lies in this—that if Admiral Pearson, having reached a rendezvous which was demonstrably nearer to Berehaven than it was to Falmouth, had at the "last moment" decided to go to Berehaven and not to Falmouth, no fair-minded umpire could have given judgment against him, nor can any fair-minded critic consider Admiral Domvile to have been ill-advised in taking exactly the opposite view. It is, at least, matter for congratulation that rules framed so loosely as to sustain this paradoxical conclusion produced results so satisfactory on the whole, especially when it is considered that rules far less loosely framed for the operations of the Channel Fleet ended in a fiasco which can only be regarded as less than deplorable by those who hold that manœuvres themselves are a farce.

II.

French Naval Manœuvres.

Character of the operations.

Manœuvres were carried out simultaneously during the month of July by the Mediterranean and Northern Fleets. Copious *précis* of both series of operations will be found in the Naval Notes of the *Journal of the Royal United Service Institution* for September and October last. In both cases the operations were restricted in scope, and no large ships were specially mobilized for the occasion. In the Mediterranean the Active and Reserve Squadrons operated at first independently, but in the last stage of the operations they were opposed to each other, the Reserve Squadron acting as an attacking and the Active Squadron as a defending force. The preliminary operations consisted of a series of evolutionary exercises, such as torpedo attack and defence, firing at moving targets, scouting at sea, and so forth. They appear to have presented several interesting features, but for the reasons given in the *Naval Annual* for last year they cannot here be examined at any length. "Such exercises are seldom reported in sufficient detail to afford an opportunity for profitable criticism, nor could criticism be of much value in any case, unless it proceeded from an eye-witness professionally qualified and familiar with the executive methods and traditions of the particular Navy concerned."

Coaling at sea.

One point may be noted, however. It is stated that in the course of the operations, "the First Division refilled their bunkers from a collier, experimenting with the Temperley apparatus, each ship of the Division, beginning with the Carnot, proceeding to sea for the purpose, and steaming at a speed of eight knots while the coaling was proceeding." In default of more explicit detail as regards the precise method employed, the rate of coaling obtained, and the condition of the sea at the time, it would be rash to attach too great importance to this statement, which must seem almost incredible to those who have seen the Temperley apparatus at work in our own service.

Theme of the main operation.

The main operation was defined by the following theme: "The Reserve Squadron (representing an enemy), being off the east coast of Corsica, attempts, on the night of July 25, either by passing to the north of Cape Corsica or through the Straits of Bonifacio, to reach a strategic point on the coast between Marseilles and Mentone with the intention of bombarding it." The operation was to be considered successful if the squadron could remain four hours before the point selected without being interfered with by the Active Squadron. The

latter was to try and prevent the enemy succeeding in his attempt, and the operations were to come to an end at 8 A.M. on the 27th. The Active Squadron took station in two divisions, one in the Gulf of Juan, some twenty-five miles west of Mentone, and the other at La Ciotat, some fifteen miles east of Marseilles. A cruiser division was placed, in the course of July 25, on a line of some twenty-five miles in extent, running north from Cape Corsica. In all, eight cruisers and five *torpilleurs de haute mer* were employed, but one cruiser was detached to occupy the Straits of Bonifacio in co-operation with the torpedo-boats of the Corsican *Défense Mobile*, and while the main line of observation remained stationary during the night—the inshore stations being occupied by the torpedo-boats and smaller cruisers—one or two of the latter were detached for more active scouting. The Reserve Squadron had but a single third-class cruiser, the Milan, and four *torpilleurs de haute mer* at its disposal. On the evening of the 25th, it took up a position in the neighbourhood of the Island of Gorgona, and despatched the Milan and torpedo-boats in two divisions to make a diversion in the neighbourhood of Cape Corsica, the Admiral himself intending to pass farther to the north. The Milan and her consorts effected their purpose with complete success, and the main body of the Reserve Squadron passed unobserved during the night. How this could have happened is not very clear, but the fact is indisputable. It would seem that the cruisers of the Active Squadron must have been rather feebly handled, and not very skilfully disposed. To place a squadron of fast cruisers on a line of observation, and to keep them stationary there, is to reduce their proper function as scouts to that of mere look-outs, and to employ them to no better purpose than that of a series of signal stations at sea. As a French critic observes, the strength of a scouting cruiser lies in her speed and her mobility.

Proceedings of the defending cruisers.

On the morning of the 26th the cruisers of the Active Squadron exchanged signals and informed each other that nothing had been seen of the main body of the enemy, the proceedings of the Milan and her consorts being regarded as a feint. They accordingly assumed that he had passed through the Straits of Bonifacio, and proceeded to scout for him on that hypothesis. By accident they found him early in the forenoon, and managed to keep touch with him all day as he steamed to the westward. As soon as he was discovered a cruiser was despatched to the signal station at Calvi to inform the Admiral of the Active Squadron of his position and course, and the receipt of this intelligence apparently had the effect of inducing the division stationed at the Gulf of Juan to proceed to the westward. In the course of the night the Reserve Squadron

suddenly altered course to the northward, and eluded the observation of the hostile cruisers which had so far kept touch with it. It passed between the Alger and the Cosmao, and was apparently seen for a moment under the searchlights of the former, but effective touch was not regained, and the Reserve Squadron appeared at 3 A.M. off Ville Franche to the eastward of the Gulf of Juan and maintained its position there unmolested for four hours, as required by the rules.

The theme criticised.

French critics have pointed out that the signal stations were very badly served—*le service de nos sémaphores a été, comme toujours, exécrable*—and that the cruisers of the Active Squadron were not very skilfully handled. The result seems to show that both these criticisms are just, but in default of more detailed information a foreign commentator must needs speak with reserve. That the whole scheme of operations was based on the questionable assumption that the proper function of a sea-going fleet is to evade its enemies on sea and attack them on shore is, however, a criticism which is not disallowed by lack of information. If the place to be attacked is strongly fortified, ships have little chance against it. *Un canon à terre vaut un vaisseau à la mer.* If, on the other hand, it is only lightly defended, the game hardly seems to be worth the candle. As was said in the *Naval Annual* of last year, "the calculus has yet to be invented which can express the objects of naval warfare in terms of the destruction of signal stations." But this question has so often been discussed in these pages that no more need be said on the present occasion.

Operations of the Northern Fleet.

In the operations of the Northern Fleet, after a series of preliminary exercises similar to those carried out in the Mediterranean, the Bouvines was told off to represent a squadron of hostile battleships having for its object the attack of either Brest or Penfret, near the Glénan Islands, on the southern coast of Finistère. The cruisers of the second division, the Bruix, Friant, Cassini, and Salve, together with a flotilla of torpedo-boats, were attached to the Bouvines as scouts. The first division operated as a defending force. The field of operations was bounded by the meridian of the Ile Vierge, on the north coast of Finisterre, very nearly due north of Brest; and the Bouvines, leaving Cherbourg on the morning of July 15, was to pass this meridian in the course of the day, and having done so might detach her cruisers to scout at a speed of 12 knots; but she herself was not to go more than thirty-five miles from the coast. She was to be held to have accomplished her purpose if before the evening of the 16th she had passed a certain point in the neighbourhood of Brest or Penfret without coming under the fire of the defending force,

consisting of the Hoche, Valmy, Tréhouart, Jemmapes, Dupuy de Lôme, Pothuau, Surcouf, Épervier, and Lance, and a flotilla of torpedo-boats. The Hoche and Jemmapes were alone reckoned as battleships, and assigned a maximum speed of 8½ knots, all the other ships being employed as cruisers, the Valmy and Tréhouart with a speed of 10 knots, and the remainder with a speed of 12 knots. It may be observed in passing that this limitation of speed, which had its counterpart in several phases of the operations in the Mediterranean, is a very noteworthy feature of the French manœuvres. It seems to show either that the French Naval authorities do not trust their ships to maintain their high nominal speeds for continuous steaming at sea, or that they do not appreciate the value of the training and experience to be gained from scouting at high speed. However this may be, the cruisers of the First Division, disposed in various directions so as to cover the field of action assigned to the Bouvines, failed to discover her, and the battleships stationed at the entrance to Brest failed to intercept her. This was due to a thick fog, of which the Bouvines, skilfully piloted, took full advantage. She made for Brest and was adjudged to have accomplished her purpose. In the English manœuvres of 1896 it was shown that a fleet making for a friendly port could not, in certain conditions of weather, be denied an entry by a superior hostile fleet keeping watch in the offing. The Bouvines confirmed this experience, but she did nothing more. She certainly did not show that a Naval attack on a strongly-fortified port is at all more likely to be undertaken in actual warfare in these days than it was in the days of old. Brest was blockaded for months and even years in the last century and the beginning of the present. But no admiral who commanded the blockading squadrons ever thought of directly attacking its land defences with his ships. There is nothing to show that an enterprise never attempted in former times by men like Hawke, St. Vincent, Collingwood, Cornwallis, or Nelson, is any more likely to be attempted hereafter by any admiral who knows his business.

The second phase of the operations.

In a subsequent phase of the operations of the Northern Fleet its whole force was concentrated in Quiberon Bay for the purpose of intercepting a hostile force represented by the Tage and the Sfax, coming from the Mediterranean with the object of making a descent on some point in the Bay of Biscay, between Rochefort and Brest. The Tage and the Sfax were to proceed at a speed of 12 knots, and were to cross the meridian of Cape Finisterre between 8 P.M. on July 18th, and 4 A.M. on July 21st. Thenceforward they were not to go to the westward of a line drawn across the Bay of Biscay at a distance of twenty miles from the Spanish coast and from

Ushant, but within that limit they might steer any course which was most convenient for their purpose and alter course as they thought fit. They were to be considered successful if they remained for six hours at anchor at some position or other on the coast to be menaced by them without being molested by the defending force. The cruisers of the latter were in this case allowed to steam at 15 knots, and in the event of the enemy being discovered the Friant was to be despatched with the intelligence to the Admiral of the Northern Fleet, and to make her passage at a speed of 17 knots—this high speed being specially ordered in order to test the Niclausse boilers with which the Friant is provided. It may here be mentioned in passing that although the Friant was unable—owing to a heated bearing, due, it is stated, to an ill-judged attempt to increase speed too rapidly—to carry out this part of the programme, she is said to have run continuously for six days and nights at a speed of 16 knots, and subsequently to have maintained a speed of 17 knots for 15 hours. This is undoubtedly a very creditable performance.

Course and issue of the proceedings.

The Dupuy de Lôme, the Pothuau, the Bruix, and the Friant were told off to look for the enemy in the neighbourhood of Cape Finisterre. The battle squadron occupied a central position defined by a series of preconcerted rendezvous. The enemy was first sighted by the Pothuau at 6 P.M. on the 19th. At this moment the Friant was temporarily disabled, and could not fulfil her appointed mission of carrying the intelligence to the Admiral at a speed of 17 knots. The Bruix was despatched in her stead, but being unable to steam more than 15 knots she appears to have missed the rendezvous. The next morning the Tage and the Sfax were still followed by the three remaining cruisers of the defending fleet, which had kept touch with them during the night. The raiding cruisers were then making a course for Rochefort, and the Friant was despatched to inform the Admiral. As soon as the Friant was out of sight the Tage and the Sfax altered course for the Glénan Islands, and thereupon the Pothuau was despatched to inform the Admiral, leaving the Dupuy de Lôme alone to watch the enemy. Apparently perplexed by the contradictory intelligence received, the Admiral resolved to steer to the westward. The Tage and the Sfax again altered course, steering this time for Belle Isle, the Dupuy de Lôme still keeping touch with them and never losing it until the close of the operations. On the morning of the 22nd, as the raiding cruisers after many fruitless attempts to throw the Dupuy de Lôme off the scent were still making for Belle Isle, the Épervier, quite by accident, appeared suddenly on the scene. Judging from this fortuitous *rencontre* that the battleships could not be far off, the Tage and the Sfax now finally altered

course for Brest, and by this move ran into view of the defending fleet, which followed and overtook them before they could accomplish their purpose. This last change of course was fatal. Had they persisted in making either for Isle d'Aix or for Belle Isle, they would, it is stated, have won the day.

These proceedings afford little scope for comment. Their resemblance to the proceedings of our own Reserve Fleet is sufficiently obvious. Both themes are vitiated, from a strategic point of view, by the mischievous hypothesis of a "sudden descent" for purposes of territorial attack. In the one case by accident, in the other by design—that is, by a more efficient and more judicious use of cruisers as scouts—the raiding squadron was intercepted. But, except in manœuvres, it really makes very little difference whether so futile an enterprise is prevented or not. Whether against fortified places or against undefended coasts, there is nothing to be done by an inferior fleet in a few hours which can compensate it for the enormous risk of having to encounter a superior fleet known to be in its neighbourhood. If it is prepared to fight that superior force, it will certainly seek to do so before attempting any territorial enterprise whatever. In that case it becomes at once the assailant and not the evader, the seeker and not the sought, and all the conditions of the problem are altered. If two fleets, known to be in the same waters, both want to fight, they will not lose much time in finding each other. If one seeks only to evade and the other to discover, more time may be spent in the operation, but the final issue will depend, as before, on the result of a conflict at sea, not on the effect of a theatrical demonstration against the shore. But setting aside the question of strategic actuality and regarding both series of proceedings as merely exercises in the important art of scouting, the instructive lesson may be drawn that both in the French and in the English Navy that art is still almost in its infancy, empirical in its methods, and precarious in its results.

Criticism of the proceedings.

Italian Naval Manœuvres.

The Italian manœuvres were on an unusually large scale as regards the mobilisation of *personnel* and the number of ships employed. The operations lasted from November 10th to December 18th. In character they were officially described as an "experiment in mobilisation," and it follows from this description that their interest was rather administrative than strategic. An account of the proceedings, taken from *Italia Marinara*, will be found in the *Journal of the Royal United Service Institution* for February, 1898.

Nature of operations.

The Italian Naval writer, "Jack La Bolina," has also furnished the *Naval Annual* with some valuable notes, and the comments which follow are largely, but not exclusively, based on the information supplied by him.

General remarks.

The main purpose of the experiment was to test the organisation established in Italy for placing the whole seaboard of the peninsula in a condition of efficient maritime defence. Italy, of course, has a very extensive seaboard, and the configuration of the peninsula, affecting as it does the disposition of the railways and other strategic means of communication, is held by the Naval and military authorities of the kingdom to offer peculiar temptations to maritime attacks of a raiding character. Whether this is so or not is a question which a foreign critic must needs approach with considerable reserve. But it seems obvious to remark that attacks made on an enemy's coasts by a mobile Naval force are best repulsed, or at least deterred, by a mobile Naval force opposed to it, and that a fleet or a ship likely to be interrupted in its enterprise will think twice or thrice before it expends much of its sparse ammunition or lands a considerable fraction of its not too numerous fighting force with the comparatively insignificant object of blowing up a railway bridge or destroying a signal station. The thing can be done, and very likely it will be done in war, until it is ascertained by actual experience whether or not the results attained are commensurate with the means employed and the risks incurred. But no very profitable inference can be drawn from the fact that in all operations of the kind which were carried out during the Italian manœuvres the attack was adjudged to have got the better of the defence. There was no defending fleet, and of course the forces employed only fired blank cartridge.

Character of the mobilization.

All the effective ships of war available in Italian waters were mobilized for the purpose of the operations. This was apparently done by temporarily denuding the harbour ships and training establishments of their *personnel* without drawing upon the Reserves properly so-called. It is true that certain classes of the Reserve proper, officially styled *richiamati*, were nominally summoned to the number of some 8000 men, but as soon as these men had reported themselves in the proper quarter they were dismissed to their homes again, their names being transmitted by post to headquarters to show the number of those who had answered the summons as well as the number of absentees, which is stated to have been very small. As the means of transport, either by sea or by land, is stated to have been more than ample for the 8000 men thus mobilized on paper, "Jack la Bolina" seems to think that a paper mobilization of

the kind satisfied all the purposes of the experiment; but on this point the remarks of *Italia Marinara* seem to be much to the point:—

"This experiment has indeed served to show how many military—perhaps 'combatant units' would be the more appropriate phrase—in case of war would answer to their names, and could be sent day by day to their ships or regiments. We do not criticise the method, which was the most economical possible, but it might have been equally well ascertained by a simple study of the roster. But the difficulty of mobilization does not consist only in the number of absentees, but in preparing means of transport for the men, ships to receive them, points of rendezvous—all concrete issues, and not to be resolved by a paper parade war with the most vague approximation. In fact, we want something real, and if that is not possible, we must be content with studying the roster. The papers which we put in motion instead of the men is a most excellent invention, but in reality we cannot conclude a great deal from it, for the letters repose tranquilly in the train, whilst men require space, accommodation, nutriment, etc."

Signal-stations staff.

In the case of the staff of the signal-stations, however, and of a certain portion of the territorial Militia—a force specially organised for the defence of the coast against maritime raids—a real mobilization took place, and the rapidity with which this was effected seems to have given great satisfaction to the authorities. All the signal-stations from the western frontier round to Venice were mobilized, and placed on a complete war-footing for fifteen days, and the territorial Militia of the first zone, from Vado in the Gulf of Genoa, to Circello at the northern extremity of the Bay of Naples, were called out and posted at their stations. In addition to this, the maritime ports were put in a position of defence, provision was made at the arsenals for the repair and supply of ships, and many of the coast fortresses were manned, equipped, and held in readiness. The signal-stations are stated to have worked with great efficiency. "All the semaphore service of the three seas as far as Venice," says *Italia Marinara*, "was in constant request, and the correspondence by night between the various stations was carried on without interruption." "Jack la Bolina" reports to the same effect, though he mentions that the observation of ships passing by night with lights extinguished or screened was not always very successful. This is the common experience of English and French manœuvres, and the remark may in some measure be extended to ships passing by day. In the rapid transmission of intelligence, signal-stations are constantly of the utmost service. In its collection and accurate interpretation, on the other hand, they are too often deplorably inexact and inefficient. It would be interesting to know if the experience of Italy corroborates that of England and France in this respect. If not, it would seem that Italy has solved a problem which has so far baffled other Powers.

Territorial defence unsuccessful.

On the other hand, it appears that the defensive efforts of the territorial Militia were uniformly unsuccessful. This conclusion,

however, must be accepted with all the qualifications indicated above, and is in any case rendered of little value for practical purposes by the absence of a defending fleet. Raleigh long ago pointed out that ships at sea will always move faster than troops on shore. Hence a raid is nearly always possible, and will, perhaps, generally be successful in proportion to the insignificance of its object and the shortness of the time required for its execution. But modern ships of war are not too lavishly supplied with ammunition, nor are their crews more than sufficient to carry on the work of the ship and fight their guns in action, due regard being had to the inevitable casualties of war. They are not very likely to waste the one or risk the other on enterprises trivial in themselves and liable to interruption at any moment so long as the enemy's fleet is undefeated and at large.

Fleets *versus* Forts.

The only other incident of the operations which seems to invite comment was an attack by the fleet on the forts in the Straits of Messina. According to *Italia Marinara* the plan of operations was as follows:—"The squadron will attempt to force the Straits at full speed to reach the fort or continue their route, the forts to hinder the movements of the fleet if possible. The operations will show how many shots can be delivered from the forts in a given period of time on an enemy's fleet attempting to force the Straits. If the fire from the forts is considered by the judges sufficiently heavy and well-directed to cause serious injury to the ships, they will return at night and attempt to take the forts by a *coup de main.* If the fire is not considered sufficiently heavy or well directed to cause serious damage to the fleet, the ships will proceed to their destination." Operations such as these are not, perhaps, to be taken too seriously in a strategic sense. They were probably designed more for the purpose of testing the vigilance and activity of the forts and their garrisons than for the purpose of solving the strategic and tactical problems involved. As Farragut showed repeatedly in the American War, ships can pass forts at speed, provided the forts are not too formidable and the ships are well handled and led with intrepidity. But if the forts are too formidable for the ships to pass, and inflict on them a disastrous repulse, it is not very likely that a fleet which had suffered so crushing a defeat would be in a position to return forthwith to the attack and attempt to carry the forts by a *coup de main* without adequate military assistance. Forts must be very feebly defended to allow such a *coup de main* to succeed, and they could hardly be very well designed and disposed if the attempt could even be made without bringing the defeated ships again within range of their already victorious guns. If it could be so made, prudence and common sense would surely dictate that it should be made before

attempting to pass the forts and not afterwards. In actual warfare a commander who thus sought to put the cart before the horse would assuredly find that such a proceeding could at best only end in a strategic movement to the rear.

German Naval Manœuvres.

The only accessible information concerning the German Manœuvres of 1897 appears to be the account of the special correspondent of the *Neue Preussische Kreuz Zeitung*, who was present at the operations on board the Blücher, the flagship of Admiral Knorr, the Official Chief of the German Navy. A *précis* of this account is given in the *Journal of the Royal United Service Institution* for November and December 1897, and a French translation of the same account will be found in *La Marine Française* for January 1898.

The mobilised fleet. The fleet taking part in the manœuvres was constituted in two squadrons, the first with two and the second with three divisions, and to each division a flotilla of torpedo boats consisting of two divisions was attached. Four cruisers were attached generally to the fleet, to be employed as occasion required—the Gefion, Stein, Charlotte, and Carola, but the three latter were of slow speed and obsolete type, and the lack of fast cruisers for scouting purposes was naturally the subject of much adverse comment. Each battleship division had one or more "despatch vessels" or "avisos" attached to it, and the fifth division of the Second Squadron was composed of four first-class armoured gunboats of no great speed or seaworthiness. The "avisos" were found useful for purposes of rapid communication between adjacent squadrons, but they were pronounced to be not fitted for extensive scouting service.

Character of operations. The operations began on August 16th and lasted till September 22nd. They consisted mainly of evolutionary exercises of various kinds, such as torpedo attacks, target practice, steam tactics, long-distance signalling, and the like, but comprised two series of operations, one in the Baltic and the other in the North Sea, of a larger strategic character. The narrative of these operations is for the most part too meagre to sustain examination in detail, but several points of interest may be noted.

Torpedo operations. The torpedo operations were conducted throughout with great vigour and persistency, but apparently with no larger measure of assured success than is generally the case with similar operations in other navies. There was the usual conflict of testimony as to the advantages claimed by boats and ships respectively, and the same inevitable uncertainty as to whether what is done in time of peace,

where torpedoes do not explode and guns fire only blank cartridge, can be done in time of war when these conditions are reversed. No fresh light appears, however, to have been thrown on the real problem of torpedo warfare, namely, how torpedo boats are to find ships cruising at sea by night, and how, if they do find them, they can best be repulsed before delivering their attack. It seems certain that in weather favourable to their operations torpedo boats well handled will often be able to approach within striking distance of ships known to be lying in an open anchorage; but this is not much more than to say that in time of war ships will no more lie in anchorages exposed to torpedo attack than they will attempt to coal under the guns of a hostile fortress. Questions such as these will only be finally solved when war occurs. In the meantime it would appear that German naval officers have already learnt to handle torpedo boats with astonishing skill and intrepidity. "It was really marvellous to see these little craft executing intricate manœuvres at such high speed, with the bows of each literally hanging on to the stern of her leader." This exceedingly close formation appears to be peculiar to the German Navy. As an exercise in nerve and seamanship its advantages are manifest, but its tactical value is not apparent. It is certain that torpedo boats could not attack in such a formation, nor could they even cruise in it at sea without largely increasing the chance of their detection by an enemy. It is even probable that a higher degree of skill is required in our own service for the accurate and sustained preservation of a more open formation, and it is certain that such a formation is better adapted for all tactical purposes.

In-efficiency of coast defence ships.

Two other subsidiary points invite attention. One is the comparative inefficiency, which many critics have often suspected, and the experience of last year has confirmed, of the so-called coast defence ships of the Siegfried class, even in a moderate seaway, and the other is the advantage of smokeless coal for the use of warships. It appears that during the operations in the North Sea, off the mouth of the Elbe, "the barometer was unsteady, with a rough sea, and the admiral, with his coast defence ships, under these conditions, dared not make an attack on the heavier and much more seaworthy ships of the enemy. Indeed, it was difficult for the ships of the Siegfried class* to work their guns in the rough sea." The German chronicler of the operations considers that this experience proves that "big battleships are and will remain the *ultima ratio* of the struggle on the sea;" and it is not without interest to note the characteristic

* The Siegfried class are of only 3500 tons displacement, and were built for coast defence.—Ed.

but not very convincing comment of the organ of the *nouvelle école Française* on this *dictum:* "Pour être complet l'écrivain allemand aurait dû dire, 'pour le combat sur mer *par mauvais temps;*' mais il ne fait pas toujours mauvais temps, et puis, comme il faut être deux pour se battre, toute la vanité de cet avantage du mastodonte saute aux yeux."

Disadvantages of German coal.

It appears that "German coals only were used by the fleet in the interest of the home trade. This coal is very unsuitable, from the large amount of smoke it emits. . . . The experience of these manœuvres gave ample opportunity to emphasise the convictions of the great disadvantage which would attach to the fleet using this inferior material:—1, betrayal of the position of the fleet; 2, sheltering the enemy by disabling the arm of the artillery; 3, frequent disablement of members of the crew by grit and cinders in the eyes." This last disadvantage is, however, by no means unknown in ships which use smokeless coal, and in our own torpedo boats and destroyers it has necessitated the supply of "goggles" to officers and crew. But it is certain that the use of smokeless coal confers great tactical and even strategic advantages, though the statement that the use of such coal as is often supplied to German warships "in the interest of the home trade," would disable the artillery arm must be left to rest on the authority cited.

Operations in the Baltic.

The principal strategic operation in the Baltic consisted of an attempt made by one squadron to discover another and prevent its reaching its objective without fighting an action. The Blue or attacking squadron was to cross a line between Bornholm and Rügen at a specified time and endeavour to effect a junction with an imaginary ally in the neighbourhood of Dantzic. The Yellow or defending squadron had its station at Neufahrwasser, the port of Dantzic, and leaving that position at a time corresponding with the movements assigned to the Blue Fleet, was to endeavour to intercept the latter and frustrate its purpose. The Blue Fleet was duly discovered—no very formidable task, as the distance from Bornholm to the German mainland nowhere exceeds seventy miles—but it was not intercepted. Its position appears to have been fully ascertained late in the afternoon of August 24th. But as soon as it had "become somewhat dark Admiral Thomsen"—who commanded the Yellow Fleet—"ordered his fleet to retire for the time, his intention being to avoid a contact with the Blue during the night, when the task of breaking through would be made much lighter." He appears to have intended to bring on a decisive action the next morning. But he failed to realize that, as Drake said, "the advantage of time and place in all martial actions is half a victory, which being lost is irrecoverable."

By 8 P.M. the Blue Fleet was ascertained to be near the land, steering eastward. "What passed afterwards could not be followed clearly, but the result was that the Blue Fleet reached the vicinity of Dantzic without serious opposition." In the absence of more detailed information the proceedings of the Yellow Admiral would appear to be inexplicable. It can only be said in general terms that a commander who, having obtained touch with his enemy, deliberately severs it during the night, cannot expect and does not deserve to win the day.

Operations in the North Sea.

The operations in the North Sea consisted of a series of engagements between two opposed fleets, one again designated the Yellow, and composed of the more powerful and sea-going battleships with a small contingent of not very fast or efficient cruisers, and the other a force charged with the defence of the approaches to the Elbe and of the adjacent coasts. The starting-point of the Yellow Fleet was a rendezvous situated at lat. 55° N., long. 6° E. The defending forces were distributed along the coast from Borkum, at the mouth of the Ems, to Sylt, off the coast of Schleswig. The battleships and larger vessels were divided into two comparatively weak squadrons, originally stationed one near Borkum and the other near Sylt, but the advance of the Yellow Fleet soon dislodged the latter, which effected a junction with the Borkum Squadron between Heligoland and the mouth of the Weser. With the advance of the Yellow Fleet, and the concentration of the defending forces, the strategic interest of the proceedings comes to an end. Their tactical interest resolves itself into a series of alarms and excursions, not without varied educational value, but scarcely calculated to solve any of the real problems of war. The conventional awards of mimic warfare were impartially distributed by the umpire between the two combatants, but from the nature of the case no decisive results were or could be obtained. "Next day," says the German chronicler in conclusion, "the manœuvres were repeated, a desultory action between the attack and the defence, in which it was impossible to say which had the advantage, and which could only be decided by actual war. It may be said, however, that if the Yellow were victorious, and had rendered the defeating fleet harmless, it could blockade the Elbe and Weser undisturbed, send a few ships up the river, and lay the rich merchant harbours in ruins. If the defending fleet were victorious, which, under the conditions obtaining is very improbable, the enemy would have to retire considerably crippled; or in the third place, the conditions of 1870–1 might be repeated; the enemy could lie untouched before our doors, and our own fleet be confined to the duty of protecting itself and our own ports. In this case, also, our trade would be destroyed, and the Elbe

and Weser seriously threatened, for the manœuvres have shown that the enemy would have full liberty of action before the Elbe."

With one exception these propositions are not less obvious than unimpeachable; but their proof lies in the nature and history of naval warfare, not in the results of a series of make-believe operations. It is a self-evident proposition that if, of two contending fleets, one is victorious, it attains its object, whatever that object may be. It is not less obvious that if one declines to fight it can only defend itself by running away and placing itself where its adversary cannot get at it. But it is not equally clear how it can defend its own ports in these conditions. "Ships which do not love the open ocean"—to borrow a phrase of the present Lord Warden of the Cinque Ports—will in the long run defend neither themselves nor their ports; for they gain nothing and lose much by skulking in waters which hamper their mobility and impair their freedom of evolution. On the other hand, a fleet which proposes to "send a few ships up a river" must needs satisfy itself beforehand that there are no forts on shore strong enough to deny them a passage. *Un canon à terre vaut un vaisseau à la mer*, and when it comes to defending a narrow and tortuous estuary, a few guns not of extreme calibre, but well placed and well handled, are worth a whole armada of ships which do not love the open ocean. Nevertheless, it remains as true now as it was in the days of the Armada—or in the days of Salamis, for that matter—that the surest way of preventing attacks on the shore is to impeach the enemy's fleets at sea.

General observations.

JAMES R. THURSFIELD.

CHAPTER VII.

Britain's Food Supply in War.

The dependence of this country upon imported food is regarded in some quarters as a danger to the community and as a blot upon the commercial development of the United Kingdom. Landowners and farmers have good reason to deplore the decline of British agriculture, and the nation at large cannot be altogether indifferent to the shrinkage of the rural population, the clustering of men into the towns, and the ill effects of this movement upon the physique of the working classes. Great Britain, once a great agricultural country and capable of supporting her own population, has become one of the principal workshops of the world, and has long ceased to be self-supporting in the direct sense of the term. Chimney-stacks and a network of railways have arisen in place of green fields and waving corn; the towns are alike great centres of wealth and of the most squalid misery. Thousands of men and women are unable to obtain regular employment, and live from hand to mouth. Meanwhile, the population is increasing to an alarming extent; the working classes do not emigrate to our Colonies in proportion to the increase; and the competition for employment grows more and more severe. We see in these conditions certain dangerous possibilities, and of these the most serious of all is the possibility that war may find us unprepared to guard the trade routes. It is fitting that we should be gravely concerned with this question, for the prosperity of our great Empire depends absolutely upon the capacity of the British Navy to keep those trade routes open, even though we should be forced to meet the world in arms.

History furnishes no previous example of a great, wealthy and powerful nation being forced by economic, political or geographical conditions to rely so largely as England does to-day upon the natural products of her rivals and possible foes. A recognition of our unique position bids the country to remember the lessons of history and set its Fleet in order; but there is a small body of writers and politicians which is not content to rely upon the Navy alone for the protection of our food supply, and who of late have been clamouring urgently for the establishment of a wheat reserve. This question formed the subject of a valuable debate in the House of Commons as recently as

6th April, 1897. In the previous month the London Chamber of Commerce, after hearing an able address from Mr. Stanley Machin, passed the following resolution: "That, in the opinion of this meeting the dependence of the United Kingdom on foreign imports for the necessaries of life, and the consequences that would arise therefrom in the event of war, demand the serious attention of Her Majesty's Government." That "serious attention" the question has doubtless received; but the result of the Parliamentary debate alluded to is regarded as a mere shelving of the difficulty by the advocates of a wheat reserve. The fact is that politicians who are alive to the risks of the situation are too often credited with protectionist proclivities, or with personal interest in the revival of agriculture; and even when free from bias, are usually unable to deal convincingly with the Naval aspects of the problem.

Our food supplies in peace.

In order to understand the difficulty of maintaining an adequate food supply in war, it is first of all necessary to show the extent of England's dependence upon foreign food, how food is conveyed to these shores, and to what interruptions our supplies may be liable in war. The conditions under which we are fed in time of peace have changed enormously with the development of Free Trade. In the early years of this century, and throughout the Naval wars which terminated in 1812, the United Kingdom was practically independent of foreign food supplies. During the French wars food was dear; but it is none the less the fact that the Kingdom was self-supporting. Invasion, not starvation, was the chief danger apprehended by our forefathers, and, so long as they maintained a strong Navy, they were secure.

Decline of home-grown wheat.

In 1801, when our population numbered only 16 million persons, the price of wheat rose to 119 shillings per quarter; but it is clear that these high prices were due, not only to the war, but to the monopoly enjoyed by the landowners and farmers. This is proved by the fact that until many years later England was fully capable of producing wheat for the whole community. Thus, in 1821 (six years after Waterloo) enough wheat was grown in the Kingdom to supply 18,800,000 persons, and only 600,000 were dependent upon foreign wheat.* Ten years later home-grown wheat supplied 21,850,000 persons; and in 1841 the Kingdom produced enough wheat for 24,280,000 persons. The figures of 1841 are especially noteworthy as marking the maximum production of home-grown wheat. The Corn Laws were repealed by Sir Robert Peel in 1846, and henceforth the ill effects of Free Trade upon British agriculture began to exhibit themselves. It is true that in 1841 1,200,000 persons were already dependent upon foreign wheat; but this

* *Quarterly Review*, 1873.

section represented only $\frac{1}{25}$ of the population. The steady decline of agriculture in subsequent years may be shown as under:—

	Population dependent upon home-grown wheat.	Population dependent upon imported wheat.
1841	21,280,000	1,200,000
1851	23,550,000	3,930,000
1861	21,500,000	6,706,000
1871	19,278,000	11,661,000
1880	12,152,000	22,352,000
1897	7,000,000	33,000,000

It will be seen at a glance from these figures how steadily British agriculture has declined in consequence of foreign competition. At the present time our annual consumption of wheat and flour amounts to over 28 million quarters, whilst the cultivation of wheat in these islands produces not more than 4 to 6 million quarters. We obtain about 19 million quarters from foreign countries, and between 3 and 4 million quarters from India, Australia, and Canada. In other words, we are dependent upon *foreign* countries for two-thirds of our breadstuffs, and have besides to import from India and the Colonies. As Mr. Seton-Karr, M.P., forcibly puts it, "Five out of six Englishmen are fed upon imported breadstuffs." In time of peace we are thus able to obtain bread and all other kinds of food at very moderate prices, and, to this extent, Free Trade has justified the highest expectations of Cobden, and conferred solid benefits upon the country.

Dangers of position.

The decline of agriculture may be regarded as a matter of minor importance if England can be sure of maintaining her food supplies in time of war; but if it should be found to involve serious danger, it becomes absolutely imperative to adopt a remedy. The object of this paper is to show that the artificial conditions of living to which we have been brought by the decline of agriculture will assuredly constitute a danger in war, unless the Navy is maintained at the needful strength. The danger to which England is exposing herself is neither defeat at sea nor actual starvation, but such a rise in the price of food in general and of breadstuffs in particular as must be expected to cause terrible distress and disorder amongst the industrial classes of this country. It behoves Government to guard against this danger, to face the question boldly, and to adopt one of the three remedies still open to us.

The facts and figures already quoted with regard to the decline of agriculture and our steadily increasing dependence upon the import of wheat and flour are not in dispute. We have seen that in 1841

England grew wheat for the supply of over 24 million inhabitants, and that twenty years later, long after the repeal of the Corn Laws, 21½ million persons were still fed upon home-grown breadstuffs. Thus far our farmers were still able to compete successfully with the foreigner, and, even down to the year 1871, over 19 millions of Englishmen were fed upon home-grown wheat, and only 11½ millions upon foreign wheat. Of late years the decline of native agriculture has been more rapid, but it would be beyond the scope of this paper to examine the causes which have accelerated the evil. Suffice it that in 1897, with a population of fully 40 millions, the United Kingdom only produced sufficient bread for about 7 million persons. Unless British agriculture can be stimulated, it is evident that its decline will continue, and that this country, with its ever-increasing population, must become, in future years, more and more dependent upon imported food. It is estimated, for example, that in 1916 our normal increase of population will oblige us to import 4½ million quarters more wheat than in 1896, and it may be noted that 4½ million quarters was precisely the amount produced by the United Kingdom in the poor season of 1895.

Increase of imported food.

But if Free Trade has taught us to depend upon the foreigner for the cheap loaf, it has also produced extraordinary results as regards all other kinds of food. Year by year England has encouraged the import of larger quantities of foreign food, until she has come to rely upon these imports to so great an extent that one cannot contemplate any interruption of this vast trade in food without apprehension of the effects that would be produced upon prices. To emphasise our dependence upon imported food, some valuable figures may be quoted from a paper read by Lord George Hamilton before the Royal Statistical Society in February, 1894. Lord George Hamilton showed that between 1871–91 the value of food imports increased from £64,713,000 to £115,487,000. This increase in value of over 51 millions sterling in twenty years is striking, but the following table of quantities is more reliable for the purposes of comparison :—

Food imports.	1871.	1891.	Percentage of increase.
	Tons.	Tons.	
Live animals, representing .	90,500	171,500	89·5
Dead meat	99,500	489,500	392·0
Butter, margarine, cheese .	127,500	270,500	112·1
Wheat	1,969,500	3,315,500	68·3
Flour	199,000	836,000	320·0
Maize	841,000	1,341,000	59·5
Other corn and meal . .	1,188,000	2,072,000	74·4

From these, and other tables which need not be quoted, Lord G. Hamilton estimated that there had been an increase in the import of

food to the enormous extent of 88 per cent.; that the home product of food had been practically stationary; and that the growth of population during the period was 20·7 per cent.

Mr. Stephen Bourne, another excellent authority, examined the ratio between imported food and home produce in a paper read before the Manchester Statistical Society in November, 1892. Comparing statistics for the years 1876 and 1891, Mr. Bourne arrived at the following conclusions: that out of 33 millions of inhabitants in 1876, 18 were fed upon home products and 15 upon foreign supplies; whilst in 1891, when the population was 38 millions, 16½ were fed upon home products and 21½ upon foreign supplies. If we accept these figures, it will be seen that the Kingdom in 1891 was dependent upon imported food to the extent of 55 per cent. Referring to Mr. Bourne's paper, Lord G. Hamilton said: "On that estimate, every inhabitant of these islands is dependent upon imported food for 189 days in the year, and if those imports suddenly ceased, he would be foodless for over six months in the year. Foreign food supplies have during the last twenty years gradually obtained this preponderance because home-grown food has almost reached its full limits of remunerative production. . . . This process must continue, and if its development during the next twenty years is as rapid as it has been in the past, in a little more than twenty years hence home produce will have receded from being less than a half of the total supply of food to less than a fourth. Whatever danger, therefore, a temporary stoppage or dislocation in the transport of our system of sea-borne food might now produce, will be aggravated as time rolls on." The main fact to be gleaned from these statistics is that, in time of peace, more than half the total quantity of food consumed in the United Kingdom is brought to us across the seas.

Shipping. In considering the transport of food and raw materials to the United Kingdom, one can but deal generally with tonnage statistics, as the statistics do not enable one to determine the tonnage of British and foreign ships more particularly employed in conveying food to this country. For the year 1895 the total tonnage in the foreign trade entered and cleared with cargoes at ports in the United Kingdom was 67,630,659. Separating British and foreign tonnage, we obtain the following figures:—

	Steam.	Sailing.	Total.
British	46,622,721	3,302,834	49,925,555
Foreign . . .	12,700,053	5,005,051	17,705,104
Total British and Foreign	59,322,774	8,307,885	67,630,659

These figures show that 12 per cent. of our sea-borne commerce was still carried on by sailing vessels. In the same year 21,003 vessels, with an aggregate tonnage of 8,988,450, were registered as belonging to the United Kingdom. The sailing tonnage was 2,866,895, or nearly one-third of the total, the steam tonnage being 6,121,555, made up of 8386 vessels. More recent information shows that the decline of our sailing trade has continued rapidly. At present scarcely 10 per cent. of our commerce is dependent upon British sailing vessels.

British commerce, 1793-1814.

In considering the interruptions to which British commerce and food supplies may be liable in war, it should be useful to glance back at the conditions that governed our sea trade early in the century. In the year 1792, the last year of the peace, British exports and imports were valued at 44 millions sterling. A century later our trade had increased in value to the enormous extent of 671 millions. The British carrying trade prior to the war was done by 3,151,389 tons of British and 479,630 tons of foreign shipping.* In 1800 the value of our trade had increased to 73 millions (official valuation), and was carried on by 4¼ million tons of shipping, of which nearly 1½ million tons were foreign. A very substantial increase in the commerce of the Kingdom was thus accompanied by a decline in the employment of British vessels, and greater dependence upon neutral ships. Captain Mahan explains this increased reliance upon neutral ships as follows:—"The demand of the Navy for seamen, the risk of capture, the delays of convoy, entirely arrested and even slightly set back the development of the British carrying trade; while at the same time the important position of Great Britain as the great manufacturing nation, coinciding with a diminution in the products of the Continent . . . . called imperiously for more carriers."

The Navy during the Great War.

To defend her commerce in the year 1800, England maintained in commission 100 ships of the line and 368 frigates, sloops, gun-vessels, and cutters. At this period, says Captain Mahan, the English Navy was stronger than the combined fleets of Europe. In spite of the almost continuous war from 1793–1814, British commerce expanded steadily, and was never at any time seriously crippled by the French cruisers and privateers.

In the years 1808–9 England maintained more battleships and cruisers in commission than at any other period during these wars. At the commencement of 1809 she had afloat 113 ships of the line and 567 fighting ships of lower rates, from frigates to cutters. This magnificent fleet was manned by 130,000 seamen and marines. As regards officers, the numbers employed were: post-captains, 689;

* "Influence of Sea Power upon the French Revolution."—Captain Mahan.

commanders, 543; lieutenants, 3,036; masters, 491. There is no need to insist upon the relative superiority of the British Navy between 1795 and the downfall of Napoleon. It is true that France began the war in 1793 with 76 ships of the line; but Captain Mahan has drawn a lurid picture of the decadence of the Navy of France as the result of the Revolution, and has shown that the discipline and *personnel* never rallied from the effects of that social upheaval. So great was the strength of England's Navy at this period that she was able to extend her commerce and afford adequate protection to her shipping, despite the energy with which the *guerre de course* was carried on by the cruisers and privateers of her foes. If space permitted, many examples of the activity displayed by the French cruisers and privateers might be quoted. In September, 1795, as James relates, a convoy of 63 British merchant ships, guarded by seven ships of war, sailed from Gibraltar *en route* to England. Of this convoy 31 sail were captured by the French. The privateer *Bordelais*, captured in 1799, is known to have taken 160 British prizes in four years. This vessel had the keel of a 38-gun frigate, mounted twenty-four 12-pounders, and carried 220 men. The English Channel was infested with privateers, even after the inferiority of the French Navy had been fully demonstrated, and these preyed successfully upon the trade concentrated in those narrow waters.*

Insurance. The precise effect of the *guerre de course* upon the rates of insurance cannot easily be estimated. Vessels sailing without convoy, as those engaged in the coasting trade had to do, were insured, when insured at all, at heavy rates; † but the convoy system, combined with the great number of cruisers maintained for the protection of our trade routes, enabled merchants to insure their vessels at strictly moderate rates. The French, in the early period of the war, made strenuous efforts to destroy our trade with the East Indies, and between 1798–1805 the insurance rates for vessels engaged in this trade fluctuated between 8 and 12 per cent. After 1805 these rates declined, and the trade from Bombay to China, one of the most dangerous routes, fell to 8 per cent., with a return of 3 per cent. if sailing with convoy.‡ Captain Mahan, who has dealt very ably with the effects of the war upon British commerce, estimates the average

* "From St. Malo to the Texel," writes Captain Mahan, "a distance of over three hundred miles, the whole coast became a nest of privateers of all sorts and sizes—from row-boats, armed only with musketry and manned by a dozen men or even less, up to vessels carrying from ten to twenty guns and having crews of one hundred and fifty. In the principal Channel ports of France alone, independent of Belgium and Holland, there were at one time in the winter of 1800 eighty-seven privateers, mounting from fourteen to twenty-eight guns, besides numerous row-boats."

† Sometimes as high as 13 per cent.

‡ Captain Mahan.

annual loss of British shipping at 3 per cent. at the commencement of the war, and if his estimate that the total loss of shipping between 1793–1814 amounted to about 1,275,000 tons be accepted, the loss throughout the war was only 2½ per cent.

To obtain any convincing estimate of the amount of protection which Britain is capable of affording to her commerce to-day, it has seemed desirable to consider the defence of British commerce under the following conditions: (1) British naval supremacy maintained fully; (2) British Naval supremacy disputed. There is a third possibility which can be dismissed in a few words. If our Navy sustained crushing defeat, and we lost command of the sea, it is obvious that such a disaster would involve commercial ruin to the nation. England would quickly be starved into surrender, for although there might be some weeks' supplies in the Kingdom, the bulk of the working classes would be deprived of employment and unable to purchase food.

The Navies of Modern Europe.

Although there is no need to examine in detail the Naval strength of the Powers against which England might have to contend to-morrow, one must give passing notice to the fact that, though England has developed her Navy and, in the past decade especially, has added largely to the fleet, relatively her sea power has declined, owing to the great development of other Navies. Russia, which was of no great Naval importance early in the century, has become a first-class Naval Power; Italy has built up a considerable fleet; Germany's Naval progress is already a factor in politics; and France, so long our most formidable antagonist at sea, is, beyond all question, a much stronger Naval Power than she was at any period between 1793–1814. No expert will deny that the French Navy has increased enormously in efficiency since the wild days of the Revolution. During the Reign of Terror the French Navy lost nearly all the superior officers upon which its efficiency depended; inferior officers rose to high station; mere merchant skippers were placed in command of ships of the line. Even Napoleon failed completely in his endeavour to restore efficiency to the disorganised Navy of France. To-day the conditions have completely changed. The French officers are capable, the men well disciplined; whilst modern science tends to destroy many of the advantages enjoyed by British seamen during the old wars. Recognition of the value of sea power has led to this remarkable growth of the Navies of Europe, and to-day the British Navy is relatively less powerful than it was early in the century. Meanwhile our commerce has developed enormously, and we have become the great carrying Power of the world.

Decline of relative strength.

Assuming England able to maintain her Naval supremacy in time

If command of the sea is maintained.

of war, what effect would war produce upon our food supplies? The proposition in this form is too vague. We must assume further that the enemy has a Navy, and that every effort would be made to injure our commerce. This assumption is justified by the persistent efforts of France in the old wars—efforts which were continued long after the superiority of our battle fleets had been established. It is thought by many Naval authorities that one of the first effects of war would be the extinction of that portion of our trade which is carried on by sailing vessels. On this point Vice-Admiral Colomb says, in his "Essays on Naval Defence," "It is the universal opinion that a declaration of Naval war would be the signal for the abrupt cessation of the sailing trade all over the world." In his paper on "Ocean Highways," to which previous reference has been made, Lord George Hamilton examined the statistics for 1890, and argued that the elimination of the sailing trade would have deprived England of 16 per cent. of her sea carriage. In 1895, as I have previously shown, the loss would have been 12 per cent.; and to-day, owing to the decreasing use of sailing vessels in the foreign trade, the loss would probably be 10 per cent. or less. However victorious our Navy, it seems barely possible that the sailing trade could be resumed during the war; but we may take it that the extinction of this portion of British trade would not be calculated to produce nearly so much effect upon food supply as upon the import and export of raw materials and manufactured goods. Some effect upon the import of food (especially grain) would, no doubt, result. On the other hand, this view of the total extinction of the sailing trade is not universally accepted. In the Southern hemisphere, which is beyond the range of the enemies' cruisers, it seems quite possible that British sailing-ships might continue to ply, and that cargoes might be transshipped at such ports as the Falkland Isles. But, even so, sailing-ships would be exposed to great risk of capture if they ventured to make the English Channel, and the insurance rates would be prohibitive unless we were successful in destroying the enemies' cruisers. It is unnecessary to insist upon this point by reason of the decline of our sailing tonnage.

Sailing trade.

Steam trade.

We turn next to the steam trade. In 1895 the steam tonnage in the foreign trade, entered and cleared with cargoes at ports in the United Kingdom, amounted to 59 millions, of which 46½ millions were British, and 12½ foreign. It is upon these vessels that England would depend for her imported food; and, assuming a dominant Navy, it may be safely inferred that the loss of shipping by capture would be no greater than between 1793–1814. If the trade routes were adequately guarded by our cruisers, the enemy's battleships

unable to quit their ports, and if the old system of convoy were revived, there is a fair presumption that the risk of capture would be smaller for the steamers of to-day than for the sailing-ships of the former period. Much would depend, however, upon the revival of convoy, and the number of cruisers available for the protection of trade routes. As regards the latter point, we received last spring the following assurance from the First Lord of the Admiralty: "The honourable member (Mr. Seton-Karr) must think the Admiralty very remiss in their duty if he supposes they have not considered, and considered in detail, the number of cruisers required to protect our ocean trade routes in time of war, and their distribution. Every spot where cruisers ought to be placed has been the subject of careful thought." But whilst it is satisfactory to receive such an assurance as the above, one cannot forget that some very capable critics deny emphatically that the number of British cruisers is sufficient to protect the trade routes. We are assuming, however, that the trade routes can be well guarded—that our supply of cruisers is sufficient. This implies that the battle fleets would be amply furnished with scouts, that swift cruisers would be distributed in every sea, with cruising ground assigned to them, and that there would still be enough cruisers and battleships available to convoy the slow steaming "tramps" upon which British commerce is mainly dependent.

Even in these ideal circumstances the country must be prepared for considerable increase in the price of food. In the Crimean War, as we are so frequently reminded, the quartern loaf rose to the high price of a shilling, although Russia was powerless to injure our trade by attacks upon British shipping. This great increase in the price of bread during the Crimean War can be clearly traced to our inability to import wheat direct from Russia, but it is a mistake to suppose that we were actually deprived of the Russian supplies, for we imported largely through German ports. We are now less dependent than in 1854 upon Russian wheat, so that a future war with Russia might be expected to produce less effect upon the price of bread. Still we are confronted here with a significant example of the dangers to which England is exposed. In the Crimean War free trade failed to give us the cheap loaf, and although our commerce was flourishing and the trade routes secure, corn rose to artificial prices. This is precisely the peril to which we are likely to be exposed in the next Naval war. We are now far more dependent upon imported food than we were in the fifties, and although we may be able to obtain our corn from America in time of war, it is not probable that we shall secure the necessary supplies at peace prices.

Increase in price of food.

Another very serious feature of our dependence upon foreign

between the United States and England admitted that provisions were not generally contraband, but might become so without breach of the law of nations in certain cases which were not defined. It was stipulated, by way of relaxation of the penalty of the law, that "whenever provisions were contraband the captors, or their Government, should pay to the owner the full value of the articles, together with the freight and a reasonable profit" ("Kent's International Law"). But international law apart, the attitude of America would be likely to hinge upon the capacity of her Navy to enforce respect for her interests, and, at present, America's Navy is weak. On the other hand, she would be certain of British support.

Have we sufficient cruisers?

We have next to consider the amount of protection that could be afforded to England's large fleet of slow steamers when command of the sea is disputed. In these circumstances our battle fleets would be combining to strike a crushing blow, and for a time, at least, no battleship could be spared for commerce protection. So long as we were not outnumbered by the Allies in battleships, cruisers would suffice for the protection of our commerce, because the battleships of the enemy would not be free to attack our convoys. Our own battle fleets would monopolise the services of many cruisers, thus reducing the number available for the trade routes.

Steam-power has certainly conferred upon England some advantages. It should be possible for us to convoy fleets of steamers, even those of low speed, with greater security than was afforded to our sailing-ships in the old wars. The steamer is independent of the wind, and can follow any route selected, whilst the sailing-ship had to rely upon trade-winds and follow very definite ocean highways; she is, at the worst, much faster than the sailing-ship, and could maintain an average speed of eight or nine knots an hour. In these circumstances our merchant fleet could be guarded by cruisers throughout the voyage, and kept in compact formation. The sailing convoy often consisted of many hundreds of vessels, and was scattered over a large area. Our frigates often witnessed the capture of stragglers without being able to interfere, and these conditions can scarcely recur. Even in the narrows of the English Channel our convoys should have little to fear, our losses should be very small —provided we have enough cruisers. Distinguished foreign officers hope to injure our trade with torpedo-boats; but England has already built a great flotilla of "destroyers," and our officers consider these vessels capable of performing the duties for which they are designed. Though England has a much larger number of efficient cruisers than any probable combination of Powers, it is questionable whether we have sufficient to supply our battle fleets with scouts and protect

our trade routes.* The Admiralty assurances are very well as far as they go, but it is not possible to forget that there was a cry of "All's well!" at Whitehall within a year of the adoption of the Naval Defence Act of 1889.

To safeguard the United Kingdom from the dangers to which it would be exposed in war three alternative remedies have been pressed upon the attention of Government. With these I can only deal very briefly. The three remedies.

In 1893 the Earl of Winchelsea brought forward a scheme for the establishment of State granaries, and a debate on this project took place in the House of Lords. The Earl of Winchelsea laid stress upon the dangerous decline of wheat reserves in the Kingdom at certain seasons of the cereal year, pointing out that on the 1st June, 1893, the whole supply of English corn in the country only amounted to 2¼ millions of quarters, which was equivalent to one month's supply. He urged the necessity of maintaining, at all seasons of the year, breadstuffs sufficient to feed the population for six months, proposing, in effect, that the Government itself should become a gigantic dealer in corn. The proposed granaries were to be capable of containing in the aggregate not less than 13 millions of quarters. English wheat was to be bought up by the State, managed by a Government department, and sold at a reasonable profit in the spring. Lord Winchelsea estimated the first cost of the scheme at from 32 to 33 millions sterling, urged that the amount should be raised by loan, and argued that the public revenues would be increased by the annual profits. The scheme was condemned by Lord Playfair as socialistic in principle and unsound financially. Lord Playfair's strongest argument against the project may be given in his own words: "If Government were to go into the corn trade, all private trade would be disjointed and might even be paralysed. It was a trade that needed the greatest watchfulness . . . . But one thing was certain, that when the Government had to buy for the replenishment of its granaries it would have to buy at the top of the market, and when it unloaded its stores it would have to sell at the bottom of the market." Hence Lord Playfair showed that the Government would frequently be in danger of sustaining heavy losses over the forced sale of supplies of corn which would have to be renewed at fixed periods of the year. The State granary project does not lack supporters, but public opinion is, at present, much opposed to the adoption of an experiment which would interfere with private enterprise and dislocate the corn trade. State granaries.

The second remedy before the country was warmly debated in the Protection.

* See tables at end of Chapter III.

House of Commons on the 6th April, 1897. Mr. Seton-Karr, M.P.. moved a resolution which, in effect, condemned the policy of depending upon imported food, and his motion led to a general discussion of the situation. Here again the State granary scheme found some supporters; but an alternative project for creating larger reserves of wheat also formed the subject of debate. This alternative is, in effect, the stimulation of British agriculture. The decline of the wheat area in the Kingdom to less than 2,000,000 acres was deplored by several speakers, and Mr. Seton-Karr justly observed: "We require a wheat reserve, and the best place to have it is in the barnyards and stackyards." The sentiment is excellent, and the revival of our agriculture would benefit the Kingdom in time of war, if combined with a strong Navy; but the debate illustrated very clearly how great are the practical difficulties against which our landowners and farmers have to contend. The heavy burdens imposed upon land, combined with the free import of foreign wheat, accounts fully for the steady decline of the English wheat area. No remedy for the evil was suggested in the debate except the obvious but unpopular remedy of reverting to protective duties. Mr. James Lowther argued soundly in favour of imposing a strictly moderate tax upon foreign wheat, but the objection to this project may be quoted from Mr. A. J. Balfour's speech. Mr. Balfour said: "The broad political fact is, that for various historical reasons, partly arising out of the enormously high prices of bread which prevailed during the great war, partly out of the great controversy ending in the abolition of the Corn Laws, the masses of the country view with ineradicable prejudice the notion of any return to anything at all resembling the old protection duties that used to be levied."

A powerful Navy.

Having thus declined to adopt any measures for the establishment of State granaries, or to assist British agriculture by protective measures, Mr. Balfour, speaking on behalf of the Government, had no alternative but to express absolute confidence in the capacity of the Navy to defend British commerce in war. The present Government is not willing to adopt any measures to secure a reserve of food stuffs, and, until a stronger case is made out by the advocates of a wheat reserve, it must be conceded that reliance upon the Navy is the only practical course open to this country. War must, in any event, raise the price of food and the cost of living. The amount of this increase will depend entirely upon the strength of the Navy and its capacity to guard the trade routes.

CHARLES GLEIG.

CHAPTER VIII.

Scouting.

A revolution in Naval architecture and in weapons has naturally given rise to copious discussions. We have wrangled more or less profitably over the retention of sails, the tonnage of warships and the calibre of armaments, the relative fighting values of the gun, the ram and the torpedo, the potentialities and the disabilities of the torpedo-boat, and other questions, most of which can be definitely settled only by the ordeal of a great war. The wide field for speculation which such questions afford is, perhaps, the cause of their evident attraction. The human mind delights to deal in the abstract, and where data are inadequate or non-existent, it is open to any one to theorise at pleasure. Failing the test of war, it is necessary to bring reason to bear upon such experience—however incomplete—as is available. Progress cannot be checked for the want of crucial instances, and we have, on the whole, settled down upon well-ordered lines of advance.

There has, however, been a marked tendency to allow pure science to usurp the chief place in the training of Naval officers, and this tendency if uncontrolled involves grave dangers. It is hardly too much to say that we are selecting our future Admirals on the grounds of early precocity in mathematics, theoretical gunnery, electricity and steam. Naval history and Naval tactics form no part of a young officer's education. He has no encouragement to give a thought to either; he must, to attain success, concentrate his mind upon pure science. Even navigation will not serve his purpose so effectively as electricity. If he can devise some perfectly useless form of mine, whose mere existence on board ship may, as in the manœuvres of 1892, supply counsels of passive defence to a Navy which owes all its past glories to a policy of another description, he will further his prospects. If he discusses tactical questions with freedom and originality, he cannot count on sympathetic recognition. It follows that certain Naval matters of extreme importance arouse no general interest in this country, are not systematically studied, and appear to be left to be settled by the unaided judgment of individuals at a moment of emergency. Common sense is a wonderful solvent of difficulties; but it is not a universal possession, and, in any case, time may be needed for its operation. Moreover, the correct solution

of a tactical problem frequently differs from that which common sense appears, at first sight, to indicate. No one who has read the excellent papers of Capt. H. J. May, C.B., R.N.,* can fail to grasp the fact that analysis deliberately applied may lead to unexpected results.

Importance of scouting.

Of all the operations of Naval war, few are of more wide-reaching importance than scouting. It would be easy to show from history that the course of campaigns has been ruled by success or failure in the conduct of this service. Had Nelson possessed more frigates in 1798, Bonaparte's expedition would never have reached Alexandria, and French claims upon Egypt might not have arisen to complicate the international situation to-day. A sufficiency of effective scouts in 1805 would probably have antedated Trafalgar, and transferred the scene to the Mediterranean or the West Indies. The direct gain, in this case, might have been small; the indirect advantage would have been enormous. A chapter of history which has been persistently misread ever since would never have presented itself, and our national policy would not have been warped and enfeebled for nearly a century. In December, 1796, effective scouting gave Colpoys the chance of shattering the expedition of Hoche. Had he not muddled away his opportunities, it would have been impossible to quote the landing in Bantry Bay as a proof of the precarious nature of the Naval defence of an island State.

To Navy acting on offensive.

To a Navy which must act upon the offensive, effective scouting is of peculiar importance. To lose a chance of bringing on a fleet action may prolong a war and entail vast expenditure. Whether or not the chance is lost will generally depend upon the efficiency with which scouting duties are performed. There can be no doubt that this was perfectly realised by our great admirals, or that they, with rich and varied war experience, had evolved general principles, which were applied as far as their usually limited means permitted.† In scouting, however, as in some other matters, they perhaps assumed that their knowledge was a permanent possession, which would necessarily be transmitted to succeeding generations, and being above all things men of action, they left no record of the details of their art.‡ The absence of regulations, or of authoritative directions dealing with the subject of scouting, is natural. They would have been superfluous in days when men were trained in the only real school—that of war.

* *Journal of the R.U.S. Institution*, January and February, 1897.

† At the same time it must be admitted that our frigate commanders occasionally showed that the allurements of prize-money went far in determining their proceedings.

‡ By an exhaustive study of the logs of ships it would probably be possible to arrive at a knowledge of the general principles adopted; but what one would like to ascertain are the views of the great sea officers and their criticisms of the proceedings of the frigate captains.

For nearly three-quarters of a century the Navy has had no experience of warfare on the high seas. It has meanwhile been furnished with craft admirably fitted and specially intended for scouting operations, possessing range, certainty, and speed of action of which Nelson never dreamed. In these changed conditions is it wise to ignore the need of aids to the right understanding of an all-important branch of the science of Naval war?

Episodes of American war.

The want of any clear ideas as to the employment of cruisers has been abundantly exemplified in recent years. Captain Semmes plainly indicated how easily his depredations might have been stopped if the Federal vessels despatched to intercept the Alabama had been handled on any definite plan. The early capture of this fateful vessel and her consorts would have been a great pecuniary gain to Great Britain.

Other episodes of the American war point the same moral. In June, 1863, Second Lieutenant Read, of the Confederate Navy, in command of the captured brig Clarence, took the barque Tacony, to which he transferred his crew and his armament of one howitzer. After burning the Clarence, he proceeded to cruise on the track of the homeward-bound American trade, and succeeded in taking five vessels and eight fishing craft. Again transferring himself to the schooner Archer, he captured the revenue cutter Caleb Cushing in Portland harbour, and was at length caught by two large steamers and three tugs. Meanwhile, the proceedings of the Tacony caused a continuous discharge of excited telegrams which lasted a fortnight. "Take any vessel that can be sent to sea in forty-eight hours"—"Send out anything you have available"—"Charter more steamers and send them out after the Tacony"—such were some of the numerous orders despatched from Washington. In a short time more than forty vessels, most of them steamers, were engaged in searching for the adventurous barque, which for two weeks enjoyed complete freedom of action. The pursuing ships cruised in aimless fashion without control or system. They "rushed madly in all quarters, burned up their fuel with all possible despatch, broke down their engines, and had to put back to port for coal and repairs. Less activity in the fire rooms and more expenditure of brain tissue in devising a consistent and simple scheme of patrol, assigning each ship her geographical square to cover under reduced speed, or her own place in a scouting line," * would doubtless have produced a different result. In this extraordinary case, as in many others during the war, the want of all knowledge of principles was strikingly illustrated. "Each captain

* Lecture delivered at the Naval War College, Newport, R.I., by Captain C. F. Goodrich, U.S.N.

went largely on his own judgment, and measured the success of his cruise by the number of miles travelled." *

China-Japan war.

In the late China-Japan War, two considerable fleets stumbled upon each other, neither having made any attempt to ascertain the movements of its antagonist. It must apparently have been the principal object of the Japanese to bring the Chinese to action, and Port Arthur is only about 250 miles from Chemulpo, while Admiral Ito had several fast cruisers.† Yet the extremely important battle of the Yalu was fought by accident, and touch of the beaten fleet was immediately lost. Later the Chinese squadron moved from Port Arthur to Wei-hai-wei without being molested.

No student of our own Naval manœuvres or of those of other Powers can fail to be struck by the fact that the scientific use of cruisers is an art unknown.‡ The plain moral has been drawn by writers in the *Annual* and elsewhere. The Official Report on the manœuvres of 1891 alludes to "the importance of practice in scouting," and pointedly refers to "the as yet limited state of our knowledge of systematic scouting." There are, however, at present no signs of any practical recognition of a real Naval need.

Scouting operations.

It would be presumptuous on my part to offer my views as to the solution of purely Naval problems; but I may venture to indicate their scope, and to seek to point out the direction which practice and experiment ought to follow. The science of scouting may be defined as the operation of obtaining and transmitting information at sea, as well as that of preventing as far as possible similar proceedings on the part of an enemy. Vessels so employed may be classed as "scouts" if detached, acting singly or in groups, and "look-outs" if working within signalling distance of a fleet. The active operations of scouting may be considered under the following heads:—

I. Duties when in company with a battleship squadron at sea.
II. The patrol or examination of a given area of water.
III. The observation of a line joining two given points of coast.
IV. The observation of an enemy's port.

When it is considered that operations of this nature will have to be performed by day and night, under varying conditions of atmosphere and weather, by vessels of different speed, coal capacity and

* Lecture delivered at the Naval War College, Newport, R.I., by Captain C. F. Goodrich, U.S.N.

† "The neglect to keep touch with the Chinese fleet argues a failure to appreciate sea power in its true respects."—*Admiral the Hon. Sir E. R. Fremantle.*

‡ In some cases doubtless there was a strong temptation to keep cruisers with the flag on account of the points with which they were credited in determining the results of an action; but this alone does not account for frequent failures.

fighting power, and, further, that the corresponding qualities of an enemy's ships must be taken into account, it will be readily admitted that the resulting problems cannot be either few or simple. Scouting, like politics as defined by Mr. Pickwick, evidently "comprises in itself an extensive study of no inconsiderable magnitude." It would be hopeless, in a short article, to attempt to deal with more than the salient features which present themselves under each of the above heads.

I. With battleship squadron.

I. Cruisers attached to a fleet under weigh will be called upon to perform duties analogous to those of light cavalry with an army on the march. They are required to give warning of the approach of an enemy, to prevent his passing either flank unnoticed, to cut off his reconnoitring patrols, and to prevent his obtaining information as to the strength and direction of the movement of the force. A marked difference arises, however, between Naval and Military conditions. A squadron of battleships sighting an enemy in clear weather has ample time to assume any fighting formation which the Admiral may direct, although the absolute flexibility of a modern fleet is frequently ignored. A Military writer who could state that "a squadron of battleships is not so easily manœuvred as a division of infantry" had evidently never seen the handling of a fleet at sea. On the other hand, a Military force in moderately close country may need ample warning to enable it to show a fighting front to an enemy, and may require further time in order to avoid being brought to action on unfavourable ground. In the open sea all battle-fields are alike.

A battleship squadron under weigh will usually move with one of two objects—either to intercept and force an enemy to an action, or to evade an engagement and to reach a distant port or a pre-arranged rendezvous unmolested. In the first case, it will be essential to cover the broadest possible front, so as to minimise the chances of an enemy passing on either side unobserved. The general line of advance would usually be decided by geographical conditions, or by information or conjecture as to the probable movements of the enemy. Here, therefore, arise a variety of considerations. In clear weather, the battleships only could cover a front of observation of at least $9(n-1)+30$ miles, where n is the number of vessels, and yet remain within communication by mast-head semaphore. This, with eight ships, would mean a dispersion of 63 miles, so that concentration for battle at either extremity of the line would require more than 5 hours at 12 knots. Any three ships could, however, support each other in $1\frac{1}{2}$ hours. Putting the matter in general terms, if s is signalling distance in miles, d the distance at which an enemy's

vessels can be clearly made out, the length of line which can be observed is:—

$$s\,(n-1) + 2\,d,$$

and if k is the speed in knots, the maximum time required for concentration at either end of the line is:—

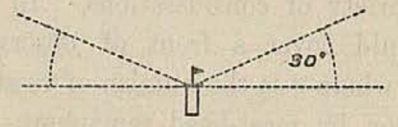
$$\frac{s\,(n-1)}{k} \text{ hours.}$$

To what extent and in what circumstances would dispersion of battleships for the purpose of extending the line of observation be justified? If the enemy was known to be at sea in weak force, some measure of dispersion might evidently be permissible, so as to minimise the chances of his slipping past. There are, however, obvious disadvantages in movement in extended line abreast, since alterations of course are not easily carried out. If the enemy is in approximately equal strength, such movement is quite impossible, since, if he is sighted right ahead, bearing down at a speed of k_e knots, contact will be effected in $\frac{d}{k + k_e}$ hours. Usually, therefore, the battleships of a squadron will be kept well in hand and the work of observation will be carried out by cruisers. How can they be disposed to the best advantage?

Dispositions of cruisers.

A line of cruisers thrown out in any direction and maintaining signalling distance will observe up to a range of $s.c + d$ miles, where c is the number of cruisers employed. If the cruisers are thrown out on either beam of the fleet, thus—

the total length of front covered will be $s.c + 2\,d$ miles, or, on a clear day with eight cruisers, 102 miles.* Such a formation would evidently be unsuitable, since outlying vessels might be cut off by superior force appearing in their front before they could be supported. A better arrangement would be to deflect the lines of "look-outs" to 30° before the beam, thus—



In this case the total extent of front observed would be:—

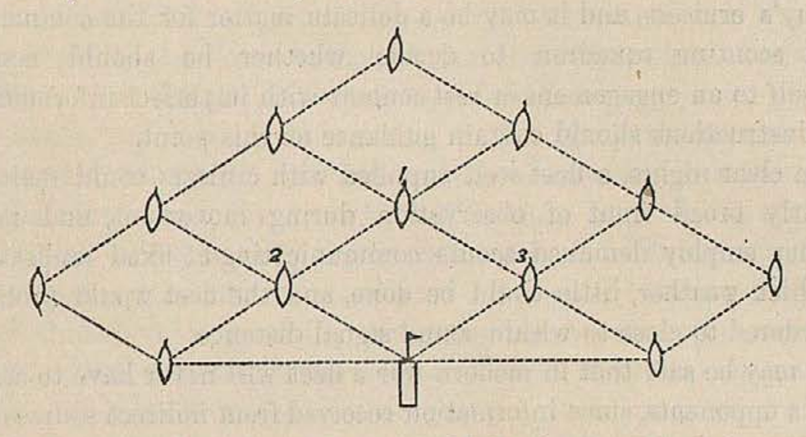
$$(s.c + 2\,d) \cos 30°$$

and the cruisers would preserve the assigned bearing from the fleet.

* Mast-head semaphores are assumed.

For a look-out directly to the front, a line of cruisers may be thrown out, maintaining communication; or a group of two or three cruisers might be detached to scout fifty or more miles to the front being spread within mutual communicating distance. Any ship of this scouting squadron could steam back with information, leaving the others to maintain observation. At 16 knots a cruiser sixty miles ahead would close to mast-head semaphoring distance from a fleet moving up at 12 knots in about 1 hr. 50 min.

If twelve cruisers were available as look-outs, they might be disposed so as to be always either 30° before or abaft each other's beam, or directly ahead or astern, thus:—



The distance of cruisers apart would be the *maximum* permitting signals to be read; and the cruisers 1, 2, 3 would keep their distances and bearings from the flag, the rest conforming. Such a formation, which might evidently be extended, would be fairly manageable in clear weather. In all cases in which cruisers are spread the largest and fastest craft would be on the outside stations.

Many other ways of handling cruisers attached to a fleet in movement might evidently be suggested. In clear weather there is an advantage in throwing out lines of look-outs, as above described, because the vessels will only be required to keep the speed of the fleet, and will therefore save coal. In other cases this method would be unsuitable, and detached groups of two or three cruisers might be employed as scouts patrolling to right and left at higher speed than that of the fleet, and communicating at assigned rendezvous. Or it might be necessary to throw out a group of cruisers to examine a harbour or anchorage, thus saving the coal supply of the battleships. In such cases the detached group would, for the time, form an independent command, which, if possible, should consist of not less than three vessels. The nature of the orders given to such temporarily detached squadrons would be of great importance. Are they to suffer themselves to become engaged, or to regard effective observa-

tion as the first object? In either case the conveyance of any valuable information to the Admiral in the shortest time will be a necessity. How can this be best provided for?

The strength of a hostile fleet in given waters will generally be approximately known. To ascertain its position and course, if at sea, will frequently be of vital importance, and the manœuvres of 1891 showed that "a reconnaissance to be of value, must be pushed home." * The Mercury and Pallas on this occasion, sent to scout for the Western fleet, reported smoke, but did not press home their reconnaissance sufficiently to obtain exact information. The latter will frequently be unattainable except by successfully engaging an enemy's cruisers, and it may be a delicate matter for the commander of a scouting squadron to decide whether he should commit himself to an engagement or rest content with imperfect information † His instructions should contain guidance on this point.

On clear nights, a fleet well supplied with cruisers could maintain a fairly broad front of observation during movement, and might further employ detached scouts communicating at fixed rendezvous. In thick weather, little could be done, and the fleet would probably be ordered to close to within sound signal distance.

It may be said that in modern war a fleet will never have to search for its opponents, since information received from indirect sources and considerations of coal supply will impose limits approximately fixing the whereabouts of an enemy at a given moment. This will sometimes be the case; but occasions will certainly arise when such search will be necessary, and we are not justified in neglecting to thoroughly investigate the means. It might have been vitally important to the Japanese to bring the Chinese fleet to action before September 17th, 1894, and as Admiral the Hon. Sir E. R. Fremantle has pointed out, "it would certainly have simplified matters for the Japanese had the Naval action taken place, say, on August 11th." ‡ In the manœuvres of 1896, the combined A and B squadrons had only to find C and D at sea in order to obtain an unquestioned victory. This was not done, and fortune favouring, C and D accomplished their object of entering Lough Swilly unmolested. In the manœuvres of 1897, on the other hand, the cruisers of the 1st Division Reserve Fleet were detached to scout for the 2nd Division, which was sighted independently by the Isis and Æolus. Although the scouting manœuvres appear to have lacked system, the information obtained

* Official Report.

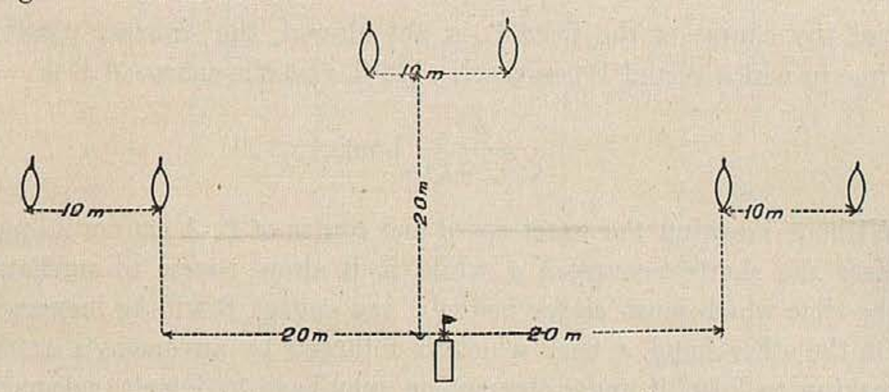
† Captain C. Johnstone, R.N., of the Narcissus, in the manœuvres of 1891, noted the difficulty of obtaining information in regard to a fleet which has its cruisers thrown out around it.

‡ *Naval Aspects of the China-Japan War.*

enabled the Vice-Admiral to correctly judge the intentions of his opponent and to reach Falmouth before the 2nd Division. The arrival of the latter seems nevertheless to have been somewhat of a surprise.

Cruisers employed in groups.

In the second case—that of a fleet seeking to evade a stronger adversary—one of two policies may be adopted. Either the entire force may be held together, trusting thus to escape observation, and, if observed by hostile cruisers, to be able to accomplish its object before the enemy can bring his whole weight to bear; or the battleships may be kept concentrated and the cruisers thrown well out ahead and on the bows to drive off the enemy's scouts, and prevent them from obtaining accurate information of the strength and course of the fleet. What is the best disposition of cruisers to secure this object? Information in such a case being of less importance than denying information to the enemy, the maintenance of communication with the fleet will be a secondary consideration. On the other hand, the cruisers will have to fight if the enemy's scouts seek to press their reconnaissance home. These conditions would perhaps be met by employing cruisers in groups of two or better three within signalling distance of each other, the *minimum* distance from the fleet being twenty miles. A typical disposition might thus be as below:—



This is necessarily susceptible of many variations, according to circumstances and the probable course of the enemy. If the battleships are steaming near a coast line, the scouting groups would be thrown out on one flank only, and more vessels could be spared. If groups of three can be employed, each pair shown in the figure might be advanced ten miles, the third cruiser forming with the pair an equilateral triangle of about ten miles side, vertex to the rear. The cruisers in any group must support each other in driving off the enemy's scouts.

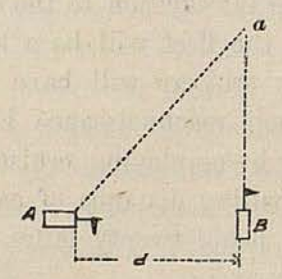
When scouts are detached from a moving fleet, rendezvous corresponding to time limits must be assigned. A scout wishing to

communicate must then steam to the particular rendezvous which she can reach within the time assigned. If the course of the fleet is changed, a cruiser must be stationed at the rendezvous to convey fresh orders.

A fleet in movement need rarely have any care for its rear, and can usually dispense with look-outs or scouts astern or on either quarter. An enemy moving at k_e knots, and sighted at a distance of d miles astern of a fleet moving at k knots, will close to effective range in

$$\frac{d-1}{k_e - k} \text{ hours.}$$

In other words, if d is fifteen miles, a superiority of 2 knots on the side of the pursuing force will bring on an engagement in about seven hours. If an enemy's fleet, A, is sighted at d miles on either beam,



and the course of the fleet B is not altered, the shortest possible time in which A and B can reach a point a on the course of B is

$$\frac{d}{\sqrt{k_e^2 - k^2}} \text{ hours.}$$

Without knowing the exact speed and course of B, A cannot at once steer the shortest course A a, while if B alters course to starboard the time which must elapse before A can engage B will be increased. On the other hand, a fleet which is followed by an enemy's scouts seeking to keep it under observation, may have to detach cruisers to drive them off.

II. Examination of a given area.

II. The examination of a given area of water might be carried out by a fleet moving with its cruisers thrown out as look-outs on a broad front as above described. It may, however, be necessary or desirable to seek to attain this object by the employment of a scouting force only as in the manœuvres of the Reserve Fleet in 1897. Assume that an area of 200 by 200 miles is to be examined. The minimum force required for the purpose in clear weather would apparently be five cruisers, which might follow the courses shown in Fig. 1 or Fig. 2, according as the examination began from an angle of the given area or from the centre of a side.

In Fig. 1 the distances to be traversed from the starting points to the rendezvous *r* are:—

Cruiser	A	210	miles.
„	B	275	„
„	C	313	„
„	D	419	„
„	E	517	„

At 16 knots, therefore, cruiser E would reach the rendezvous in about 32 hrs. 20 min., and the examination would then be completed.

In Fig. 2 the corresponding distances are:—

Cruiser	A	324	miles.
„	B	240	„
„	C	200	„
„	D	240	„
„	E	324	„

At 16 knots, cruisers A and E would reach the rendezvous in $20\frac{1}{4}$ hrs.

The movements of the ships in Figs. 1 and 2 would be timed, so that when on parallel courses the five scouts in each case

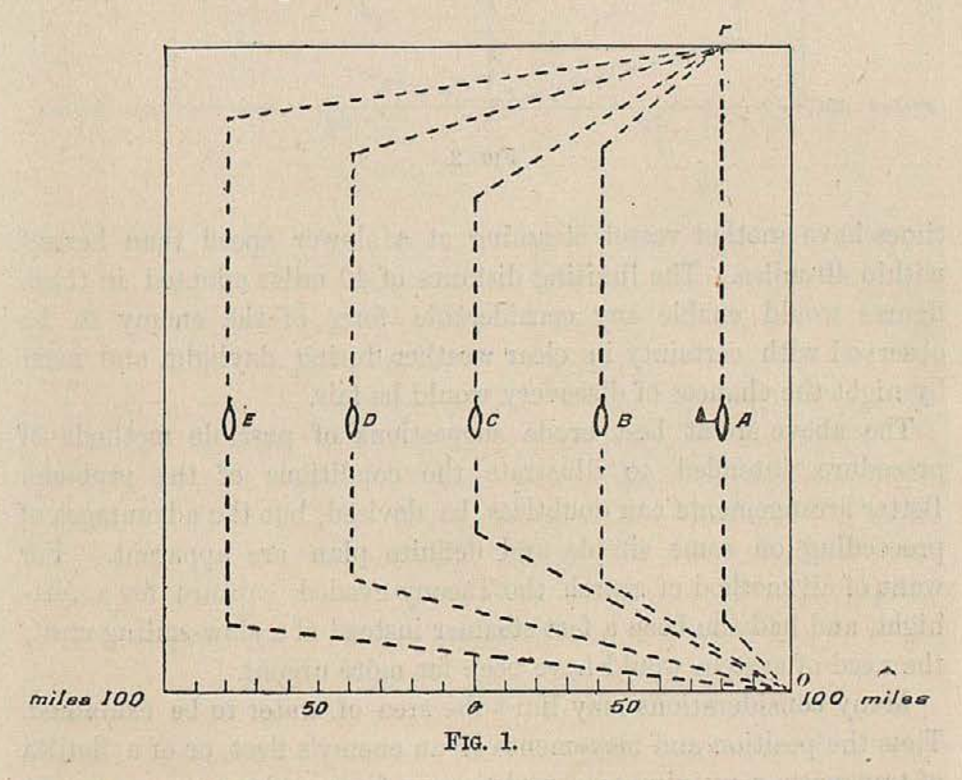
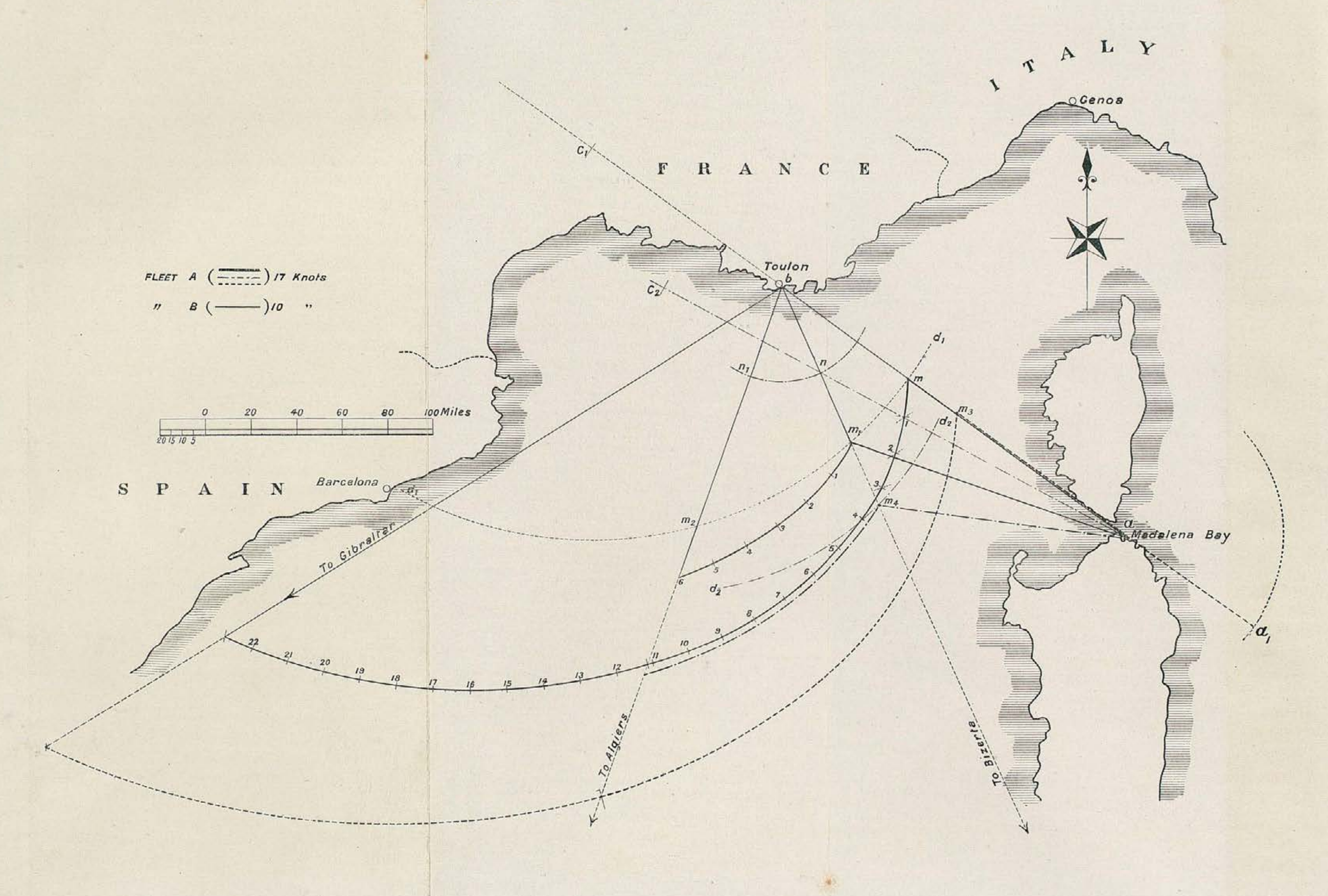


FIG. 1.

would be as nearly as possible in extended line abreast. The senior officer's ship, A in Fig. 1 and C in Fig. 2, would preserve a uniform

THE CURVE OF SEARCH



Montéchant have proposed to employ what is called a "curve of search," based upon simple geometric principles.

Assuming that an enemy's fleet has been ascertained to have left a known port at a certain hour, and to steer a straight course at a known speed, it can be found at sea, provided that the searching fleet possesses adequate speed, and that the possible courses of the enemy are subject to limitations. The following example (see plate) will serve to illustrate the application of the curve of search. Curve of search.

A fleet, A (red), at Madalena Bay, learns by telegram that a hostile fleet, B (blue), has left Toulon at a speed of 10 knots. The destination of B is unknown; but, on strategic grounds, it is believed to be Gibraltar, Algiers, Bizerta, or the Straits of Bonifacio. The speed of A is 17 knots (see plan). It is assumed that B will steer a constant course. In this case A fleet must steer straight for Toulon on the line $a\ b$. On arriving at the point m, such that $\frac{a\ m}{m\ b} = \frac{17}{10}$, and not finding the enemy, it will be clear that he has not steered for the Straits of Bonifacio and must have taken a more westerly course. At m, therefore, A fleet must begin to employ the curve of search. One hour after A arrives at m, B must be on a circle struck from centre b with a radius $b\ m + 10$ miles. If this circle is cut by another circle with centre m and radius 17 miles, a point 1 is obtained at which the fleets will meet if A has steered on the course a 1. If B is not found, another circle must be struck with b as centre and radius equal to $b\ m + 20$ miles. Cut this circle by an arc from 1, with radius equal to 17 miles, and obtain 2. Proceeding in this way by always increasing the circles struck from centre A by 10 miles (B's speed per hour), and cutting them successively by arcs with radius of 17 miles (A's speed per hour), the curve of search can be traced, so as to intercept all constant courses from Toulon which lie between Corsica and the Spanish coast. In this case, if the B admiral held a straight course from Toulon to Bizerta, he would be found—theoretically—by A in 3¼ hours after leaving m; if to Algiers, in about 11 hours; if to Gibraltar, in about 23 hours.

Supposing that it could be assumed as certain that B would not steer for the Straits of Bonifacio, but might make for Bizerta, or take any westerly course, then evidently time would be uselessly wasted if A steered straight for Toulon, and began the search curve at the point m. In this case it will be the first object of A to intercept B on the course to Bizerta. Now the locus of a point which moves so that the ratio of its distances from two fixed points, a and b, is constant, will be a circle, having its centre on the line $a\ b$ produced. The ratio in this case is 17 : 10, the relative speeds of A and B, and the locus circle

passes through m, and has its centre c_1 on the line $a\ b$ produced.* Describe the arc $d_1\ d_1$, with centre c_1 and radius $c_1\ m$. This arc cuts B's course to Bizerta at m_1; A must therefore steer for m_1, and commence a search curve at this point. Such a curve would cut B's course to Algiers in six hours after leaving m_1. If B is not found the search curve would have to be continued.

If there was reason to believe that B's course would be either direct to Algiers or further westward, A's best proceeding would be to stear for m_2, the point where the course to Algiers cuts the locus $d_1\ d_1$, and if B is not found here to commence a search curve at m_2.

Other conditions remaining the same, suppose that the news of B's departure from Toulon reaches A fleet four hours after the latter has started. Then, if it is assumed that B may take any course from $b\ a$ to the westward, A must proceed as if starting from a point a, such that $a\ a_1 = 4 \times 17 = 68$ miles, and on arriving at a point m_3, such that $\frac{a_1\ m_2}{m_2\ b} = \frac{17}{10}$, a curve of search must be begun if B is not found. Supposing that it is certain that B will not steer for the Straits of Bonifacio, but may steer for Algiers. In the latter case B will now be at n, if $b\ n = 4 \times 10 = 40$ miles; join $a\ n$, and, as before, find the locus of a point which moves so that its distance from b and n is as 17 : 10. This locus will be a circular arc, $d_2\ d_2$, struck from the centre c_2 on the line $b\ n$ produced, and cutting B's course to Algiers at m_4.† If B is not found here, a curve of search must be begun. Similarly, if all courses east of that to Algiers might be neglected, the same process would be followed dealing with the point n_1, and A would make direct for a meeting point on the course to Algiers, and there begin a search curve if B was not found.

Thus a search curve can always be commenced from any point on a locus such as $d_1\ d_1$, provided that the searching fleet reaches the locus at the time when its antagonist must be at some position on that locus. Again, it is clear that if a limiting course can be assumed (such as that to Bizerta on the plan), the best policy will be to steer for a meeting point on that course and then commence the search curve. Finally, if A, starting at the same time as B, steers

* The centre c_1 of the locus circle can always be found since m is one extremity of the diameter of the locus circle, and the other extremity is the point at which A squadron would overtake B, if the latter steered straight away (overland in this case) on the course $b\ c_1$.

† The locus $d_2\ d_2$ being based on the theory that B is at n when A leaves a, can be employed only to obtain the point m_4, and is of no further use. Assuming n_1, four hours from Toulon on the course to Algiers, as the starting point of B squadron, a point on this course corresponding to m_4 can be found. The locus of the possible meeting points of two ships starting at different times from two given points, a and b, with speeds having a given ratio, is a Cartesian oval. Points on this locus can be easily determined by the method shown for obtaining m_4.

any course which does not cut the locus d_1 d_1, the fleets could never meet under the given conditions.

Criticism of search curve.

In theory the search curve is perfect. Provided that all the conditions of the game are exactly fulfilled, that no land interferes, and that coal endurance is unlimited, the chased fleet must eventually be found. In practice these conditions can never be fulfilled. The exact speed of the enemy could not be known, and he could not be trusted to keep a constant course. If his speed is wrongly estimated, or if he alters course, the whole theory breaks down. It is practically impossible for a pursuing fleet to accurately steer on a curve of search for many hours. Thus the curve, starting at *m* and meeting the line to Gibraltar in twenty-three hours, involves altering course every hour, and even if the curve were worked for two-hour periods, eleven alterations of course would be entailed. Having regard to current and other disturbing causes, the required accuracy of steering is quite impossible. Nevertheless the general principle appears to be worth remembering. Geometry need not be despised, and situations can be readily imagined in which a knowledge of the theory of the curve of search might enable valuable time to be saved and materially increase the chances of finding an enemy. In the portion of the Mediterranean selected for illustration, a 20-knot cruiser despatched from Madalena, and employing the principles above explained, would have a fair chance of picking up a fleet moving on a constant course towards Algiers, and could then steam to a southerly rendezvous, to which A fleet might move.

In the manœuvres of the Channel Fleet last year, an attempt was made to apply the curve of search in its simplest form. The cruisers Powerful and Terrible were ordered to points respectively north and south of Blacksod Bay, thence to commence a search at 17 knots for the Blenheim, which with four hours' start was to steam from Blacksod in an unknown direction at 12 knots. The Terrible was delayed soon after starting by a defective valve, and appears not to have attempted any searching operations. The Powerful did not reach her assigned station, and began the curve of search too late, abandoning it after thirteen hours. The experiment seems to have failed because the conditions were not complied with; otherwise there would have been a strong probability of intercepting the Blenheim.

III. Observation of a channel.

III. The observation of a line joining two points of coast forming the entrance or exit of a channel is an operation certain to be required in Naval war. Naval manœuvres furnish many examples of attempts in this direction which usually ended in failure. In 1891 Admiral Puech, with B squadron, endeavoured to maintain a

line of observation of ninety-five miles between Cape Llobregat (Spain) and Cape Formentor (Majorca), with a view to intercept A squadron, expected from the west. The B battleships cruised slowly backwards and forwards in line ahead, covering the central portion of the line of observation. Two cruiser divisions were thrown out fifteen miles to the westward to patrol on a line parallel to the squadron, and twenty-five miles from the mainland and from Majorca respectively. The night was dark and stormy, but the A squadron was sighted by the Tage and Forbin, and information reached the Admiral, who by mere chance happened to be near the southern end of his line of patrol. The A squadron was quickly lost, but the Tage, sent to chase to the eastward, succeeded in picking it up again. Admiral Puech did not seek to attack, and his dispositions are certainly open to criticism.* He was, however, hampered by the want of fast cruisers. In the French manœuvres of 1893, the observation of the Straits of Dover by night failed completely.

In the British manœuvres of 1892, scouting was generally neglected. The Blue squadron made no use of its cruisers to ascertain the whereabouts and destination of the Red. A line of observation was, however, sought to be established, at first between the Mull of Cantyre and Rathlin Island, and later between Corsewall Point and the Irish coast. There was no idea how best to observe these lines with the available force, and on the morning of the 19th August the Red cruisers Galatea and Andromache slipped past, and in actual war would have destroyed the Arethusa and Blonde before support could have arrived.

In 1894, it would apparently have been an advantage to the A (Red) squadron to ascertain whether Blue intended to intercept it at the southern entrance of the Irish Channel, but although cruisers were available, nothing was attempted. In both these cases the value of the points allotted to cruisers in determining the issue of an action probably militated against their employment in their distinctive *rôle*.

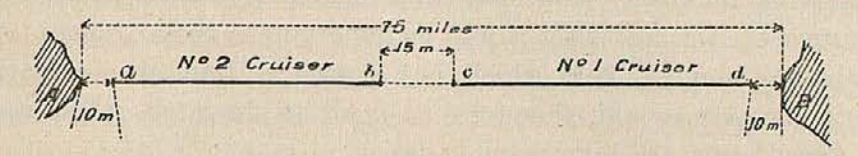
In 1896 the united A and B squadrons, after losing all touch with the enemy, proceeded northward, and established a line of patrol outside of Lough Swilly which failed absolutely.

Patrol by cruisers.

In establishing a line of observation across a channel, the main objects are to prevent an enemy's vessels from passing undetected, and to convey information as rapidly as possible to a fleet or to a signal station from which intelligence can be telegraphed. The solution must be sought in stationary cruisers, in patrol, or in a

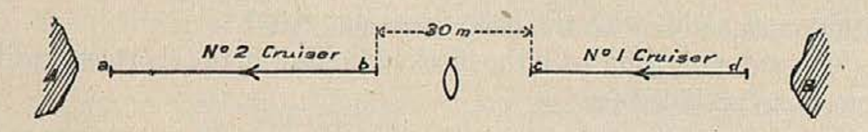
* See Mr. Thursfield's article in *Naval Annual*, 1892.

combination of the two. In clear weather a line of four stationed cruisers could effectively observe a channel about seventy-five miles wide,* and could transmit information along the line occupied in either direction. Employing two cruisers only, observation could be fairly maintained by causing each to patrol half this line at the same speed, approaching at the centre to within mast-head semaphore distance before altering course sixteen points. At 15 knots either cruiser would complete its patrol, *a b* or *c d*, in one direction in about 1 hr. 25 min.†



If information was required to be transmitted only to the shore at one end B of the line of observation, the worst case would occur if an enemy were sighted at *a*, the outer limit of patrol of No. 2 cruiser. Transmission of news to B would then take about 3 hrs. 50 min. at an average speed of 17 knots. No. 2 cruiser, meeting No. 1, could communicate, and then return to endeavour to keep touch with the enemy. If information is to be conveyed to a rendezvous at sea, the cruiser sighting the enemy would proceed there at once at her highest speed, and her consort would, in the extreme case, become aware in about 1½ hrs. that she had left her line of patrol.

The above arrangement is faulty in that, as the two cruisers steam outwards from the centre of the line of patrol, there will be a long period in which this portion of the line will be unwatched. Employing three cruisers, a better plan would be to station one at the centre, and cause the others to patrol in the same direction, thus :—



The line would be much more perfectly observed, and the chances of the undetected passage of an enemy materially reduced.

By night the most feasible arrangement would probably be to patrol the whole line with all available vessels steaming in line ahead at extreme communicating distance. In this case it is evidently desirable that, on reaching the end of the line of patrol, the ships

* Approximately the distance from Wei-hai-wei to Port Arthur.

† The distance *b c* may be the maximum at which a mast-head signal of any kind signifying "wish to communicate," can be read.

should alter course sixteen points together by signal from the leader. By altering course in succession, an appreciable loss of observing power is entailed. In the case of an important channel, it is for consideration whether two lines of patrol should not be established at such a distance apart that an enemy's fleet at its *maximum* probable speed cannot traverse both within the hours of darkness. In thick weather observation becomes necessarily difficult, and simple patrol in line ahead appears the only practicable course. Strategic and other considerations may sometimes indicate the most probable course of an enemy, and may thus enable a line of patrol to be shortened. In most cases it will be important to seek to keep touch with an enemy's fleet which has passed a line of observation. Arrangements should, therefore, be made to despatch a fast vessel in pursuit with the least possible delay.

IV. Observation of fleet in port.

IV. The observation of enemy's fleet in port is another scouting operation certain to be required in war. Vitally important issues may depend upon the efficiency with which this operation is conducted. It is now generally admitted that battleships cannot be employed in patrolling the approaches of a harbour, consuming their coal supply and running risks of torpedo-boat attack by night and in thick weather. The only alternative is to observe the port as closely as possible, and keep what is virtually the blockading fleet at a distance, husbanding its coal, and ready to go to sea as soon as the enemy quits his shelter. Whether the blockading fleet can be kept in harbour or at an anchorage, depends upon the probable activity of the enemy's torpedo craft, and on the measure of protection which can be provided. If the risks are great, the fleet must be at sea frequently changing its position.

The principal objects to be attained are the following:—

(*a*) Fast vessels to approach the entrance to the port at intervals, by day and night, with the least necessary risk.*

(*b*) Communication with the blockading fleet in the shortest possible time to be provided for.

(*c*) In the event of the enemy leaving his port, arrangements to be made to follow him and to ascertain his course.

Here arise a number of interesting considerations which can only be briefly noticed.

The immense advantage of speed is clear. A cruiser which

* This was frequently done in sailing days. Pellew's light ships watching Brest in 1796 used to stand in until chased out to sea by superior force. On the enemy's withdrawal they at once returned, and this manœuvre was constantly repeated. It resulted that the sailing of Hoche's expedition was discovered, and duly reported to Admiral Colpoys.

possesses superiority in this respect over all the vessels of an enemy can with safety approach his port to the limit of the effective range of its guns at all times. If scouts of distinctly inferior speed to the enemy's cruisers are employed, they must either be superior in force or must have supports to fall back upon in order to avoid being driven off or captured. A squadron of observation would rarely consist of less than three fast vessels, and as coal will be continuously expended, reliefs will be necessary. The importance of good coal endurance for cruisers thus employed seems evident.

The procedure in clear weather might be to lie off the port with steam in hand, or to cruise slowly at a distance which, in many cases, cannot be less than 9000 yards from an enemy's coast batteries, keeping a selected observer with a good telescope in the tops. By night or in thick weather the only course appears to be to circle in towards the port at irregular intervals, using high speed to minimise the risk of torpedo-boat attack. By day fast cruisers appear to be the most suitable craft, and the idea of employing torpedo-gunboats as an inshore squadron seems futile. They are not well adapted for observing, and unless provided with supports near at hand they would be liable to easy capture. They could, however, be employed to keep up communications. By night or in thick weather, destroyers might replace the cruisers in observation, and would frequently be able to approach close to the entrance of a port and employ their search lights for brief periods without undue risk. The maintenance of observations in these circumstances will, however, always be a difficult and sometimes an impossible task.

Suggested disposition.

If an enemy's fleet in port is to be observed from a base at 120 miles distance—approximately that of Brest from Falmouth or the Scilly Islands—the following general arrangement might be adopted. The scouting force might be divided into two groups :—

1. A squadron of four cruisers forming a detached command off the enemy's port.
2. Supports consisting of three cruisers and ten destroyers about fifty miles distant.

Assuming a speed of 18 knots to be available for short periods, information could reach the base of observation in 6 hrs. 40 min. from the front, in 3 hrs. 55 min. from the support, and in 2 hrs. 45 min. from the front to the support.* Scouts in the advanced

* In the French manœuvres of 1893, a squadron supposed to be blockaded at Hyères put to sea, and information is stated to have reached Ajaccio in 3½ hours (*Naval Annual*, 1894). The distance from Hyères to Ajaccio is about 120 miles; but details as to the working of the line of observation and the distance actually traversed by the message are wanting.

line, if chased with a start of four miles, could not be brought to action before obtaining aid from the support except by vessels of about 19·1 knots speed. The supporting force might have a fixed rendezvous during daylight, changed every night in accordance with secret orders known to the commander of the advanced squadron. By night the four cruisers could be withdrawn and replaced by eight destroyers from the support, which would remain off the port till daylight. Relief could be provided in the first instance from the support, which should always have three cruisers and two destroyers in hand with comparatively full bunkers. The coal supply of every vessel in the advanced squadron must never be allowed to fall below the amount necessary for steaming at full speed to the base. When coal runs short, ships must return to the base, where there should be a reserve of cruisers and destroyers sufficient to maintain the observing force always in full strength.

The distribution and movements of vessels in the advanced squadrons are determined by local conditions, which cannot be here discussed. It is in all cases necessary to make such arrangements that, while information is immediately conveyed to the base, the issuing fleet will be followed and its course ascertained if possible. By night this will be difficult. In the French manœuvres of 1893 the chased squadron used its cruisers astern, working their searchlights, and the battleships altered course and escaped behind this screen of light. The advantages, for purposes of observation, of such a port as Bizerta, whose exit to the sea is practically a single canal opening out on a straight coast line, are evident.

Transmission of intelligence.

If ships can be distributed along a line of communication, a higher speed of transmission of intelligence can of course be attained in clear weather. Assume for example that a mast-head semaphore message containing all that is necessary can be made in ten minutes; then nine ships at ten miles' interval would, in the most favourable conditions, cover a total distance of 100 miles from a signal station on shore, and the latter would receive a message from the outside station in 1 hr. 30 min. Such a distribution of vessels will, however, be generally impossible.

Pigeons may sometimes provide supplementary means of conveying intelligence; but their employment in war has many limitations and uncertainties, and it would be unwise to count upon them. The laying of light cables to facilitate the observation of an enemy's port is not impossible, and telegraphy without wires is in its hopeful infancy.

Minor operations which fall under this head are likely to occur in many parts of the world. The distant ports of an enemy harbouring

his commerce destroyers, and neutral ports in which his warships have taken refuge, may require to be closely watched. In such cases the problem becomes comparatively simple, and the observing force must seek to bring to action any hostile vessels which put to sea, or failing this, to pursue without any delay. Relief or coal supply will therefore be necessary.

In the foregoing pages I have sought to present some aspects of the important question of scouting. Wherever specific methods are given, they must be regarded as suggestions offered with the greatest diffidence and intended only to illustrate the nature of the problems involved. That these suggestions are open to criticism is evident. That they do not provide the best possible solutions in the assumed conditions is granted. My object has been to attempt to interest and to bring into a wider and—in this country—untrodden field of inquiry minds capable of doing necessary work which lies beyond my powers. The question of scouting is not one for any single professional expert, but for well-ordered discussion by many.

Nothing is less desirable than hard and fast instructions issued by authority and dealing with questions of this nature. The data necessarily vary; no two sets of conditions are precisely alike, and the solutions depend upon circumstances and the means available. In such matters, formal rules are to be strongly deprecated; but between the formalism which is to be avoided, and the neglect either to provide the stimulus for systematic study, or to carry out the needful exercises at sea, there is a great gulf fixed.

Military text books, good and bad, treating of minor tactics of all descriptions, of reconnaissance and of out-post duties, abound, although uncertainties of many kinds necessarily overhang all military operations. Topographical considerations innumerable over-ride theory; a heavy shower of rain will upset the plans of a commander, and the necessity for dragging supplies behind his fighting units hampers all his actions. Nevertheless, such text books serve at least to inculcate principles, and the officer who has assimilated them is better able to deal with a tactical problem than one who can bring to it only the unaided light of nature.

Naval operations, on the other hand, in some aspects, are blessed with a degree of certainty unattainable in land warfare. Many of them admit of almost purely geometrical treatment, and can be worked out with the help of models and appliances on a class-room table; it is hardly too much to say that here rather than at sea can they be best studied. Napoleon, we are told, used to lie on the floor poring over his maps, and elaborating his com-

binations with the aid of a pair of compasses. Yet those combinations were necessarily rough approximations, frequently thwarted by circumstances beyond control, or based on conditions which did not really exist. The scouting problems which I have sought to illustrate admit of definite solutions in given conditions. If the data vary widely there will in each case be some method which is superior to all others, and I venture to think that this method cannot be trusted to suggest itself on the spur of the moment to a mind not previously prepared by special thought and study. If our Naval manœuvres have taught anything, it is that the handling of cruisers is not yet understood, and that tactics are in their infancy. Yet throughout the Navy there is a mass of unwritten experience and of ideas half-formed which needs only to be organised and co-ordinated. A school of applied Naval science is absolutely necessary; at such a school, opinions now in a state of solution would crystalise, tactical problems would find solutions, and guiding principles would stand revealed. The results of study would then be brought to a practical test in the annual manœuvres, and theory corrected by experience would be embodied in books from which all officers could learn general methods instead of being left to the inspiration of the moment—inspiration which, amid a multitude of cares and anxieties, may be found wanting.

On such lines the Navies of all great Powers are now being instructed. We alone, in full accordance with our national characteristics, neglect to include applied Naval science in our system of Naval education. Such neglect is dangerous.

G. S. Clarke.

CHAPTER IX.

Precision of Fire Attainable in Action.

For many years past systematic efforts have been made to attain accuracy of fire both by Naval and coast artillery. Range finders, position finders, automatic sights and telescope sights, are all means to this end. Firing from moving platforms and at running targets has been introduced with a view to imitate conditions of service in a greater or less degree. On the other hand, there exists a school of men who throw discredit on such devices, and claim to take the practical view of what will really happen on service when all refinements will go to the winds, and something rough and ready will take its place. It is idle, they urge, to contemplate the discriminate attack of a ship, that is, aiming at any special part selected with a view to her particular structure.* It is enough to fire "into the brown," as it is termed; in short, to hit her anywhere, and apparently with anything. If this view is correct, our schools of gunnery, our designers and our manufacturing departments are wasting time and energy. Nay, even the issue of different kinds of projectiles is a mistake, for the purposes to be attained by an armour-piercing shot and a common shell are widely different, and discriminate firing is contemplated in their issue, and a decision has to be made in naming the projectile in the very order to load. Probably, however, most of those who ridicule attempts to obtain accuracy do not press their views to their logical consequences, but content themselves with discouraging much that is done without drawing any fixed line, on the ground that experience shows that disappointments and mistakes occur on service to a surprising extent, and that it is idle to expect anything else. To be really practical, however, it is necessary to ascertain whether such mistakes and disappointments, as admittedly occur on service, are unavoidable, or whether they are not decreased in the measure in which care is taken to prevent them.

Good results in war from practice in peace.

Has not skill acquired in peace told in war? To this the history of Naval gunnery gives a complete answer. In the American War at the beginning of the century, our ships, armed with carronades and short-ranging guns, were again and again defeated by the

* See Colonel O'Callaghan's paper, R.A. Institution Proceedings, October, 1895, p. 511.

American armaments and gunnery adapted to do their work at comparatively long ranges. Captain Broke turned the tables by having persistently trained his men in gunnery to an extent which is said to have brought on him a reproof for his excessive expenditure of ammunition. Mistakes and confusion are not confined to sea fighting, but have made themselves only too apparent in war operations on land, so that examples of their being overcome are to the purpose, whether by land or sea. The remarkable success of the Germans in the Franco-German War naturally comes to mind, a success which was conspicuous not only in strategy and tactics, but in the application of means which had been so perfected in peace as to bear the strain falling on them in war.

Need for simplicity.

It may be urged, in support of the view that little may be expected in the way of gunnery in action, that even brave men may lose their heads to some extent, and that while standing up to their work they may be unable to exercise their usual judgment and skill, either from nervousness or excitement. Supposing this to be true in any measure, it is doubtless necessary to make such arrangements as we can safely reckon on being carried out under fire. If a man is called upon to perform complicated operations under special stress of circumstances, a feeling of confusion almost akin to despair may seize him, and his judgment may leave him in a way that should certainly be prevented if possible, even though it be only momentary. For this reason it appears desirable to furnish means for a course of action under fire which is as simple as possible. At the same time, an alternative course which gives much better results may be kept in view for adoption, should an officer feel confidence in attempting it. For example, a good general rule may be given for the attack of any enemy with common shell fire. Such an attack must be based on a general consideration of the structures of ships of all classes. It is possible thus to frame a fairly good attack, but it is at best a compromise, and circumstances must occasionally arise when an enemy is recognised and when prolonged action would give the opportunity of obtaining much better results by attacking her in the way best suited to her particular structure. For example, unless recognition enables the presence or absence of a thick belt to be discovered, fire directed at the water-line may be wasted. A man-of-war may present a target, say, 100 yards long and 20 ft. high. This is vast, and out of all proportion to objects fired at in ordinary practice. Surely, under some circumstances, then, discriminate attack must be possible and must bring good results. Close action at sea must at times give possibilities and a scope for gunnery such as can hardly ever otherwise occur. What is there in the circum-

stances of actual war to prevent such opportunities being turned to good account?

Causes of bad results.

The main causes tending to produce difficulty and confusion in action appear to be the following:—(1) Movement; (2) Danger; (3) Novelty and a sense of responsibility. These tell very differently according to circumstances, and it is well to trace their effects separately. In considering different classes of firing it will be seen easily that excitement or nervousness tells more on individuals using small arms than on those firing heavy guns,* because in the former case the effect on each man tells on the result, whereas in the latter the gun is aimed by a picked man, who ought to be decidedly above the average. Moreover, the manipulation necessary to lay a gun is not liable to be affected in the same way as the pointing of a rifle. The heavy gun is moved by screw gear, the motion is regular, and the piece is held at rest on its platform, which, whether moving or fixed, is not affected by the steadiness of touch of the man directing the fire, whereas a rifle has both to be pointed and held steady by hand. On the other hand, it may doubtless be more difficult to aim the heavy gun on a very rapidly or suddenly moving object. It can be shown however that this tells but little comparatively in the class of object aimed at by guns. On service it commonly happens that more than one of the influences considered are in action. To judge of the effect of each separately, then, we turn to evidence of the effect of each disturbing influence acting alone, on men engaged on other operations than gunnery. For example, an awful sense of responsibility may tell on a surgeon performing a delicate operation where life depends on his skill. In some cases it may be necessary for him to act quickly, but personal danger to himself is absent. Experience which shows how far a surgeon can work with skill and steadiness, is valuable as evidence that responsibility and the need for speed can be similarly dealt with in cases of gunnery in action, considered apart from the element of danger. The success of critical operations performed almost daily in close proximity to the jugular vein, the brain and other vital parts, in our large hospitals, proves that the danger of causing instant death does not prevent the delicacy and firmness of touch in the highest degree in surgery. Gunnery may call for it in much greater numbers of men, but a steadiness and skill

* Major-General Maurice in his *War*, p. 50, speaks of "the intense absorption in the mere fact of firing, which almost like a catalepsy takes possession of the man who is using his weapon against an enemy." He says, "Many of the rifles that were picked up on Majuba Hill were found, at the last moment when the Boers were closing, sighted to 800 yards." It is noted as a quite remarkable act of presence of mind on the part of a Prussian sergeant during the attack on St. Privat, that he personally took care that the men reduced their sights to the proper range as they advanced. General Maurice specially notes that artillery are not subject to the evil thus described.

falling enormously short of the surgeon's would yield very good results.

To pass on then to the disturbing causes above enumerated :—

Effect of movement on shooting.

(1) *Movement.*—This may take place either in the object aimed at or in the gun platform or in both. The disadvantage of firing from a moving platform was strongly felt in the naval attack of Alexandria. The experience of Admiral le Hunte Ward, who commanded the Superb in this action, was described in the *Annual* for 1886, p. 341, in words which may be here quoted. "While the ships were in motion, it was necessary, as fast as the smoke cleared, to identify objects aimed at from a new point of view and then to fire at them at an altered range. So difficult was this that to deal effectually with the fort it was judged necessary to anchor." This picture is endorsed by Captain May, who was gunnery lieutenant on board the same ship. The question naturally arises, would gunnery on board a ship under way be as difficult to-day as in 1882 ?—and the answer must be that while to-day it doubtless remains much easier to fire accurately from a ship at anchor, the introduction of smokeless powder, Q.-F. ordnance and better sights * has greatly improved the chances of hitting under the conditions described ; both because the object can be kept in view throughout, and because the change in range is followed more easily than formerly. It is to be borne in mind also that all projectiles that fail to strike actual guns or some special features in coast forts are considered to be absolutely thrown away ; consequently the attack of forts involves discriminate firing in a high degree, and success is specially hard to attain. The simple fact again of the *object aimed at* being in motion causes great awkwardness to those who have only practised at fixed targets. It may be difficult to follow the moving object with the line of sight apart from the fact that the marksman may feel that he is being hurried, and so may become disturbed. For example, on a certain occasion a squad at rifle practice in India saw a jackal coming across the range leisurely and at an easy distance, and all fired at him. Instructors and other "good shots" however not only repeatedly missed the beast, but, to their intense disgust, failed to make him even quicken his pace. Now here were marksmen prepared for their attempt and subject to no disturbing influence except the substitution of a living moving target for a fixed one. The obvious remedy for this is practice at moving objects such as is now carried out.

* For maximum accuracy telescope sights are essential. To focus the eye on a sight close to it and on a distant object is impossible, and the rapid change of focus or compromise by which the marksman accomplished his object is difficult and taxes the eye.

(2) *Danger.*—Doubtless it is a great advantage for a man to possess nerves that are but little sensible to danger, and spare the possessor from strain and effort, but the exact stage at which a capable man becomes painfully conscious of danger is happily not the signal for his ceasing to be able to do even difficult and complicated work. Self-control may certainly be attained in a great measure at once, and with practice to an almost unlimited extent. It is wise, no doubt, to tax this power as little as possible, but certainly to leave scope for its use in any way that may promise good results. Often it is possible to indicate simple and more difficult alternatives, to be adopted as circumstances determine; for example, as above said, to furnish a simple rule for the attack of an unknown enemy by shell fire, and an alternative plan of attack based on a knowledge of her particular structure; or, in firing at bodies of men, to give instructions for using common shell with percussion fuses or shrapnel with time fuses. Practice at the simpler task may give the needed nerve and confidence for the harder one. In short, what seems to be needed, is a simple plan of attack, but if full confidence is felt in undertaking something further, a course promising much greater results may at times be adopted with advantage. It is thought that most officers who have had any prolonged experience under fire would testify that the endeavour was made to carry out some deliberately conceived object, and with such a measure of coolness and intelligence that it would be difficult to prove that the shooting was inferior to that made in peace time under similar conditions, danger excepted. In the capture of the Huascar, for example, the fire of her assailants must have been not only overpowering but well directed, for her steering gear was three times disabled and her turret and conning-tower shot through and through.*

Danger.

As already said, firing with small arms is more liable to be affected by nervousness than with heavy guns, yet endless examples might be quoted where steadiness in the highest degree has been displayed. Two or three examples may be given with advantage. In 1894, when several bullet-proof cuirasses were tested in this country, a young girl accompanying the professional marksman, M. Loris, habitually fired at glass balls fixed on a swinging pendulum, seldom or ever missing them, while M. Loris, standing at some distance behind her, sent a bullet through a glass ball fixed on a short spike on her cap. This objectionably-dangerous and most disturbing practice did not prevent this girl from shooting with admirable precision, and shows what may be accomplished by training in peace. To pass on to examples of danger

Instances of disregard of danger.

* See Lieut. Madan's report, U.S. Institution Proceedings, 1881, N. cxii., p. 6 5.

being disregarded in war. Individual marksmen have often displayed remarkable skill and coolness. Major Malan, of the 7th Fusiliers, then a subaltern, was shot through both legs in the attempt to take the Redan on June 18th, 1855, and having fallen twice and being faint with loss of blood, and having just seen his own colonel, Yea, shot down, he was crawling slowly back. At this time the salient of the Redan was covered by Russians, firing on those of our men who still clung about the abattis. As Malan passed a rifleman in the open covering the attack, the latter, as he loaded, expressed a hope that he was not very hard hit, and then said, "Look at that man, sir" —pointing to a Russian officer who was prominently directing the Russian fire. Malan then saw the rifleman deliberately aim and the Russian officer drop. Here, then, were men on both sides picking off leaders, and apparently in a frame of mind to observe the amenities of life at a very critical moment. Yet the strongest expression of contempt of men's capacity in danger that the writer ever heard was used by a Russian general, a really able man, but one who had not seen active service. Finally, the British Navy must ever have in memory that Nelson was shot by a marksman who was himself in a critical position of danger, and is believed to have been killed almost directly afterwards.

A siege offers special opportunities of developing accurate shooting in war, and experience as to coolness and nerve is true for all time. The siege of Sevastopol is therefore good for example. In this siege men certainly endeavoured to do justice to the rude means at their command. In conducting mortar fire, the first shell was thrown well into the enemy's works, then the firing charge was diminished little by little, until the white smoke, rising slowly from a shell burst far over on hard ground, gave place to the sharp black jet of a burst on newly-dug earth just over the parapet. In the Quarry mortar battery it was at times desired to fire at objects which could only be seen by standing on an old Russian parapet in rear of the mortars. Pickets could not be used, and each round had to be laid by eye and plumb-line by a man whose head became a mark for Russian riflemen about 300 yards off. It was certainly desirable to work quickly, for, even with the rifled musket of that date, bullets soon passed close, and a prolonged stay on the parapet certainly on one occasion ended in a man being hit; but the work was fairly done. Again, the experience of the destructive effect on men of Russian shells bursting accidentally before they struck the ground, prompted British shells being set to act thus when the enemy's works were known to be crowded. In working the guns also, men often unhesitatingly exposed themselves apparently without giving evidence of the highest motives of duty

or heroism. The carelessness of the ordinary gunner may be perhaps gathered from a conversation which the writer overheard one night in the trenches. One man complained of a certain officer making his gun-detachments go strictly through their drill motions when shot were coming unpleasantly often through the embrasure. To which another replied that, though disagreeable, that after all was their duty, but that a much more real grievance was the recent mixture of water with the rum ration before serving it out. Exceptional cases may naturally be objected to, such as that of Captain Peel, who might often be seen standing on the top of a parapet using a long telescope with apparent ease and comfort under a hot fire. Nevertheless cases arise when good gunnery may depend on the nerve of a specially selected man. In the siege of Strasburg, for example, the water in a wet ditch was lowered by cutting down a sluice which was hidden from view, by curved fire carefully calculated, which was developed and corrected by the help of a daring man who crept out at night and found means of observing the effect produced.

(3) *Novelty and a sense of Responsibility.*—By this is meant the excitement or nervousness caused by the presentation of an opportunity for a man to do great things, perhaps to make or mar his reputation, under circumstances which are new to him. This may be distinguished altogether from the element of personal danger. The Russian regiment of lancers who allowed the broken remnant of English cavalry to canter along their front in returning up the long valley at Balaclava were not afraid but dazed.* The warships that fired at the Cretan fort last year were not exposed to any fire, but does any one think that their first fire was as accurate as in ordinary practice? It is commonly found that men's individual shooting improves as war goes on, and no doubt this may be due to familiarity with surroundings as much as to actual practice in the strict sense. This however probably tells more on infantry than on heavy gun fire, and more in operations on land than in action in a ship, which is, as it were, the home carrying the surroundings of the seaman's daily life. Whatever the difficulty may be due to, novelty then can surely be best got over by imitating service conditions in time of peace as nearly as possible. The sense of responsibility has already been mentioned as overcome in a remarkable degree by surgeons performing critical operations. It also occurs in a branch of scientific work carried on under the Admiralty in which Naval officers are often engaged, namely, astronomical observations. It often happens that the fruit of many thousand pounds expenditure and

Novelty.

* See Kinglake's *Invasion of the Crimea*, vol. iv., p. 346.

some months' work has to be gathered in in a few minutes during which eye, hand, and ear are taxed to their utmost in work which, but for its quiet character, is nearly akin to the accurate laying of a gun. The necessary training which involves the cultivation of observation without prejudice, and the constant elimination of errors arising from all possible sources, causes excellent work in most cases to be done under circumstances which are in their own way critical and liable to disturb an uncontrolled mind. The preparation of observers for the Transit of Venus expedition, by the late Astronomer Royal, Sir George Airy, dealt with gross and subtle causes of error alike. Foreign astronomers were amused at a set of printed directions which commenced with the words: "Remove the cap from the object glass"—a caution for which an absurd incident had shown the necessity. On the other hand, the observers trained themselves so as to become familiar with the subtle phenomena of the transit, on a model in which a metal disc, brought to the apparent size of Venus, crossed a reflection of the sun in a mirror at the apparent rate of transit, and by this means learned how much time to reckon on, and how to utilise it so well, that nervousness, when the actual phenomenon occurred, hardly seems to have been felt by anyone, including the writer. The investigation of each man's habit of observation and the treatment of his perceptions as machinery, having an action which is to be left undisturbed, but afterwards corrected by the application of personal equations, are beside the point here at issue, but illustrate the power to apply human perceptions and actions to steady accurate work.

Gunnery practice.

Gunnery practice should be conducted under conditions as nearly approaching those of war as practicable. Naval gun practice is carried out by ships in motion at a fixed target. Coast artillery, on the other hand, fire from a fixed platform at a moving object. In both cases the target is sufficiently small to make men apt to forget how vastly larger is the target presented by a ship, which is the grandest imaginable mark, although, on the other hand, it must be admitted that a coast battery is the most unsatisfactory one. The Fig. (p. 198) shows the different targets employed in practice applied to the side of a French man-of-war, the Magenta class being selected, which is by no means the largest.* These targets will be dealt with in turn. No doubt a ship is never presented absolutely broadside on, but even at 45° the length is diminished less than might be supposed. At this angle the Magenta

* The Magenta is 330 ft. long, the Brennus 361, Jauréguiberry 364, Henry IV. 354, Carnot 382, Masséna 384, Charlemagne and St. Louis 385. While the newer armoured cruisers run from the Amiral Pothuau, 370, to the Jeanne d'Arc, 469 ft.

would still present a target 230 yards long, and the height remains unaltered.

Naval firing returns.

It may be undesirable to discuss the precise conditions under which ships carry out their annual practice, but it may be said generally that they are brought to resemble those of actual service in a considerable measure. That is to say, the vessel is run at a speed of 8 knots or 12 knots, according to circumstances. The target is fixed, but is small. The conditions imposed on each gun are intended to be such as to give all nearly equal chances of scoring, the Q.-F. guns and those which fire fore and aft, being handicapped with less allowance of time and reduced area of target. Thus it will be found on analysing the returns of the firing of the fleet, excluding the Channel and Training Squadrons, that, with few exceptions, the hits from each class of B.L. gun average about thirty per cent. of the rounds fired, as may be seen by the following table :—

Gun.	Number of rounds fired.	Number of hits.	Percentage of hits.
13·5 in.	133	36	27·1
10 in.	118	22	18·6
9·2 in.	226	76	33·6
6 in.	821	248	30·2
4 in.	1445	443	30·7
6 in. Q.-F.	960	326	34·0
4·7 in. Q.-F.	2078	670	32·2

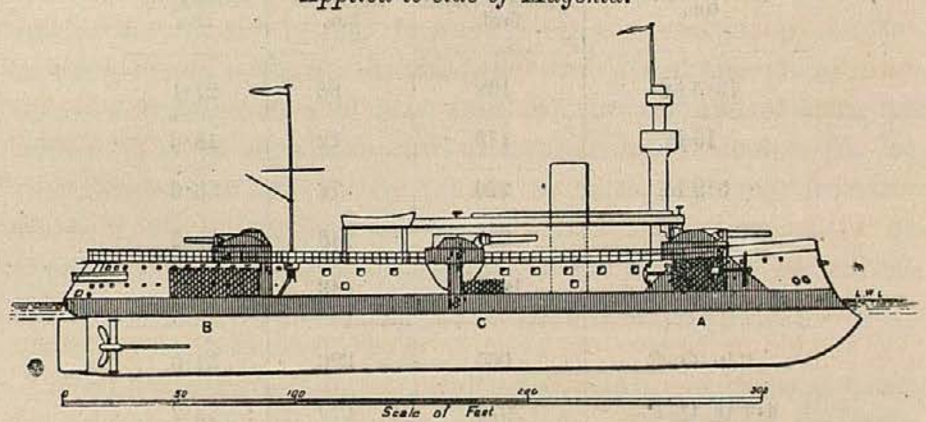
In some instances the figure is much higher; the Imperieuse, for example, scored 81·5 per cent. of hits with her 9·2-in. guns, and 61·8 with her Q.-F. 6-in.; and the Royal Arthur, on the same station, the Pacific, made 52·4 per cent. of hits with her Q.-F. 6-in. guns. The Imperieuse with 8 pieces fired 76 rounds, the Royal Arthur with 12 fired 141. Consequently the results per gun are respectively $9\frac{1}{2}$ rounds with $5\frac{7}{8}$ hits, and $11\frac{3}{4}$ rounds with $6\frac{1}{6}$ hits. Which is the better result might depend upon circumstances. Both these vessels were on the Pacific station, where the practice is conducted under peculiarly favourable conditions, so that the lesson to be learned from their superiority may be more the advantage of such good conditions as to water than any results due to good gunnery.

The bearing of the results on the question of discriminate aim may be tested by applying the target to the figure of any actual ship given.

For example, it appears probable that a 6-in. Q.-F. gun aimed at the space beneath the barbette of the Magenta class (see A in Fig.) ought to hit it once out of three times, under the conditions of practice. This implies the firing ship running at 12 knots speed, the ship fired at being motionless. If both ships were in motion the percentage of hits would be reduced, but would still remain abundantly sufficient to insure a hit very quickly, and two or three guns firing common shells ought to tax the strength of the barbette structure almost immediately, if engaging at about a mile range. So again the weak spaces extending for a considerable length in the Charlemagne class ought to be easily struck, for although lateral deviation is small in firing at a fixed mark, it is more serious with a moving one, and here the ship's movement would only affect the probability of missing to the extent in which it affected the range, the lateral scope being very great.

NAVAL AND COAST ARTILLERY TARGETS,

Applied to side of Magenta.



A. Naval Target. B. Coast Artillery Record Target. C. Torpedo-Boat Target.

As to the prospect of results from ships firing at land-defences, the annual practice may represent conditions when ships in motion fire at a fort, but small as it is, the target appears to be too large to be strictly representative for this particular object. If it is concluded that every round is thrown away which does not strike an actual gun or its mounting,* a very small target indeed is needed, such as would not give good practice, because much more is learned from a target on which a fair proportion of hits are made than from one which would be only struck very exceptionally. It would no doubt be possible to record the hits striking so near the centre of the larger target, as to represent the hitting of a gun, if such exceptional work

* A shield fixed on the gun may be an absolute evil, as it might easily happen that the gun might be dismounted by a projectile striking the shield, which would have passed on harmlessly had no shield existed.

were thought desirable to be kept so much in view. Probably the main lesson taught would be that which has been arrived at from the study of the attack of Alexandria and other operations of war, namely, that in spite of recent improvements, and the introduction of smokeless powder and quick fire, to produce any *decisive effect* ships must anchor.

Coast-artillery target practice.

Artillery practice seawards, as already noticed, is made at moving targets under what are called service conditions, which are carried out except in elementary firing. Under "service conditions" practice is made in nearly all kinds of weather, look-out parties and instruments are not allowed to be exposed to the view of the supposed enemy, no information is communicated by the range party, and casualties among all ranks are to be practised. For prize firing, a "record-target," 36 ft. by 12 ft., (see B in Fig.) is towed at the highest attainable speed. During the past year from 8 to 10 knots appear to have been common, but efforts are being made to obtain higher speed* and to improve the system of working. The range for moving targets is laid down as from 1600 to 2500 yards. At the above rate of speed at Golden Hill, Isle of Wight, the shooting is reported as follows: one company, 12 hits out of 18 rounds fired in 17½ minutes; and again, 10 hits in 12 minutes 20 seconds. Other forms of target exist, namely, "Hong-Kong" targets, towed in pairs, one to represent the bow of a ship and the other the portion to be attacked. Floating or drifting targets are also used occasionally, and torpedo-boat targets, 15 ft. by 5 ft., hauled in by a winding apparatus at an average speed of 18 knots, sometimes have been used at Shoeburyness, and it is intended to introduce them elsewhere. The following results are reported with the 6-pr. Q.-F. guns. *By day* the rate averaged 1 round in 11·9 seconds, and the hits 1 to 5·9 rounds at a target advancing from 1500 to 300 yards directly on the gun over sands. *By night* the rate averaged 1 round in 14·1 seconds, average of hits 1 to 26·5 rounds at advancing target. Running diagonally, a target 10 ft. by 2 ft. was missed one day when 30 rounds were fired, and at night a target 48 ft. by 5 ft. was struck once to 19·5 rounds. The first-mentioned torpedo target, 15 ft. by 5 ft., is marked on the side of the Magenta (see C in Fig., p. 198). This hardly exceeds in size the breech portion of one of the ship's heavy guns.

Conclusions.

The conclusion which it is suggested may be drawn from the facts and considerations discussed have probably been apparent to the reader, but may be summarised.

* General Richardson, R.A., has especially urged the need of increased speed being necessary to seize opportunities of firing at ships during limited times of exposure.

1st.—While it has often happened, and will often happen again, that things may go wrong in action beyond all expectation, that mistakes may be made, or men lose their heads, yet these evils may be prevented to a great extent, and every effort should be made to this end.

2nd.—That coolness and skill have so often been exhibited under great stress of circumstances, as to justify provision being made for high proficiency, if this can be done without over-taxing men who are not capable of it.

3rd.—That the ease and confidence necessary to prevent confusion, and at the same time the possible opening for the exercise of great skill, may be secured by the adoption of the best devised simple form of attack, keeping in view, however, any form offering distinctly better results, which should only be attempted when an officer feels strong confidence in doing so successfully.

4th.—That the realisation in action of peace achievements is best accomplished by imitating the conditions of war as nearly as possible in ordinary practice.*

Rule for attack.

The best rule that has been suggested by Naval officers for the attack of an unrecognised adversary appears to be the following:—With the exception of a few Q.-F. pieces, let all guns fire with common shell at the hull near the base of the foremast, a little above the water-line. The Q.-F. pieces above mentioned should fire at any deck structure before the funnels or about the foremast. The object of this is to pour in common shell where they will tell on nearly all armour-clad ships as well as cruisers, and to confine the executive staff inside the conning-tower and cripple the direction of the ship as much as possible. It will be easily seen by the plates of ships that this attack is specially suited to most French ships. Many of the newer Russian ships, however, would not suffer greatly, and must be attacked in the hull, like the Tonnerre class, by armour-piercing projectiles, while a well-directed common shell from a heavy gun might do unlimited damage to the interior of the Russian citadel, an opening which the separate Q.-F. gun positions of the French ships preclude. The above illustrations will be sufficient to show what is meant by a simple rule for general attack, and of the advantage of using discrimination when circumstances justify it.

C. Orde Browne.

* It may be observed, doubtless, that liability of war material to go wrong on service has not been dealt with. Speaking generally, a man-of-war ought to run less risk of mistakes in supply or failure from deterioration than a land force. Such failures, however, as occurred at Alexandria, from the Pettman fuse proving to be unsuited to slow powder, must be guarded against by trial of everything in peace time.

CHAPTER X.

Naval Reinforcements in War Time.

Armour and Armament.

Owing to various circumstances the appearance of this paper has been delayed, the principal reason being the difficulty experienced in obtaining thoroughly useful and trustworthy data. It completes a series, for in 1894 I dealt with Shipbuilding, and the enormous facilities afforded by our unrivalled private yards, and their plant, for warship construction in an emergency. In a second paper, in 1895, I endeavoured to show that there need be no apprehension as to our inability to supply Machinery for the ships we were thus able to build. Two other factors remained to examine, one the *personnel* of the private yards, and the other the subject of the present article. As to the first, for some time I was led to believe that this question of the *personnel* was of much moment, but investigation has satisfied me that, although it is to a certain extent true that the workmen fluctuate with the work, migrating from one locality to another, yet it is extremely improbable that we should experience a dearth of skilled labour, especially now that the recent disturbance in the engineering trade has shown to what a large extent the so-called "skilled engineer" is merely an ordinary fitter or a machine minder. We come then to the last, and in a sense the most important, question connected with our inquiry: Is it likely that there will be delay in the production of armour plates and armaments such as to interfere with the shipbuilding programme which could be undertaken in an emergency by the private yards? It is to be regretted that the answer given in this paper is not more satisfactory than it is.

I have said that in a sense this is the most important question connected with the subject of our naval reinforcements in war time, because I find that all the others hinge upon it. In other words, our powers of naval production, so far as the larger vessels are concerned, rest mainly upon our ability to provide shipbuilders and engineers with those materials without which construction must be indefinitely delayed and completion indefinitely postponed; that is to say, heavy castings, armour plates, and guns.

In this paper, therefore, is indicated as fully as possible the sources upon which, outside of the public establishments, we may expect to rely for the provision of the necessary armour and armaments for the vessels constructed under emergency conditions.

Raw material.

It is obvious that before attempting to describe our resources for the construction of armour-plate and guns, it is advisable to consider briefly whether any difficulties are likely to arise in connection with the supply of the steel and the raw material used in the manufacture of the ingots from which these articles are made. In the manufacture of armour plates about fifteen per cent. of Swedish iron is used, which is imported in pigs from Sweden; about eighty per cent. of Hematite pigs made from Spanish and Cumberland Hematite ores, is also used, the balance being made from Spiegeleisen and Ferro-manganese, which are manufactured in this country from manganiferous ores imported from Spain and Greece. Here, then, at the outset we are brought face to face with the fact that we largely depend upon Sweden, Spain and Greece for the ores used in the manufacture of ingots, with all the disabilities which must attach to such conditions. I have ascertained that the stocks of the material imported vary considerably, there being as a rule in this country about sufficient for from three to six months' consumption based on the normal demand. But it is not a normal demand that we are anticipating, and should, therefore, any circumstance arise to prevent the free transit of these materials over sea or to check their output in the countries from which they are exported, it could not otherwise fail than to have an injurious effect upon our manufacturing resources. Moreover, an insufficient supply of these imported ores would seriously affect the production, not only of armour-plates but of other shipbuilding materials of the quality now manufactured, since ores of equal purity to those now obtained from Greece, Sweden, and Spain are not found in this country to any extent.

Supply in war.

That circumstances might arise which at least for a time would prevent the merchants from adding to their stocks, is beyond question. In the old wars of the last, and early part of this, century, great difficulties were often experienced in obtaining the naval stores of those days, timber, hemp, tar, and the like, in adequate quantities. There is certainly a probability that similar difficulties will occur again, given similar conditions. Furthermore, the geographical condition of two of the exporting countries will not make it easier to undertake the work of bringing home to this country the ore in face of hostile cruisers, even were no restriction, forcible or otherwise, to be placed upon export. It can hardly be

doubted that these ores would be classed as contraband of war, and for this reason alone their export might be prohibited by neutrals, while, in any case, it is only natural to expect that the proprietors of the mines would put up their prices. In this connection it may perhaps be mentioned that quite recently our stocks of Spanish ores of the highest quality have been somewhat lower than usual, owing, it was reported, to their scarcity. There seems, however, to have been some doubt as to whether the assigned cause was the real one, for it has also been stated that as the mines are depleted by working, the cost of production becomes higher on account of the workings being more distant from the places of shipment; the scarcity may, therefore, be due merely to the proprietors of mines wishing to "make up" their prices a little.

This phase of the question, although of high importance, is not one that needs to be treated here at great length. It would be interesting, however, to learn whether this particular point, the supply of raw material in connection with the manufacture of guns and armour-plates, has ever received attention at the hands of the authorities. The stocks maintained by the merchants or makers would presumably be adjusted somewhat to the demand, allowing, perhaps, some margin for speculative purposes. On the other hand, the Government, being merely purchasers of the finished material, may not have hitherto considered it necessary to make a point of securing or maintaining stocks of raw material in the country to meet such an emergency as we have here in contemplation. It is a question of great importance, and one which might well deserve attention at the hands of the Council of Defence.

There are those who argue that there will be no time after war has been declared to build more ships, certainly no more armoured ships; but I have never been able to understand the reasoning by which this conclusion is reached. It does not seem probable that the British Empire should succumb to its enemies, however numerous, without a struggle more or less prolonged. And we may also give our possible enemies the credit of being able, having entered into a war with us, to at least keep it going for some months. The building of a battleship, whether in a dockyard or private establishment, could, I have convinced myself, be accomplished within eighteen months if the builders could make certain of obtaining in each case a steady supply of the armour between the sixth and twelfth months —that is to say, that the delivery should be completed by the twelfth month. Now to permit of this being done, the orders would have to be placed and the work of manufacture commenced four or five months before the ship's keel was laid, and the gun mountings, guns,

and hydraulic and electrical appliances would also have to be ordered and delivered correspondingly early. Here, then, we have a limit of twenty-three months between the date of first ordering the armour, etc., and the date of completion of the ship. Allowing a margin of a month in addition, it is plain that if every preparation had been made, and we only built one battleship in each of the four public yards, and a similar number in the private establishments, we should get a new fleet of eight vessels in two years. Does anyone believe that in this period the British Empire will have fallen to pieces? I do not, and therefore submit that the authorities ought to take every precaution, and make every preparation in order that the outbreak of war should find us with ample supplies of raw material to ensure our shipbuilders, gun and armour manufacturers, and all the allied trades in the production of ships of war being constantly employed.

Resources for ship-building.

The result of inquiries in connection with our supplementary resources for warship construction showed that there were sound reasons for anticipating that in an emergency, and providing there was no delay in the supply of materials, the private shipbuilders and machinery manufacturers would be able to turn out warships on the following scale, even if all existing Admiralty requirements were complied with:—forty torpedo-boat destroyers, as the Speedy and Havock, in eighteen months; eighty cruisers, as the Crescent and Cambrian, in two years; and twenty battleships, as the Centurion and Renown, in three-and-a-half years: and that all these vessels could, if it be necessary, be put in hand at the same time. But it was further indicated that it would probably be found more expedient, as well as more expeditious, to build in an emergency classes of vessels differing somewhat from those which we should need when entering upon hostilities.

It is an axiom of modern naval warfare that, given combatants fairly well matched, the winning side as well as the beaten will come out of action with many vessels incapable of keeping the sea for a long period. On this assumption, therefore, it is necessary for the side which expects to win to have not only a reserve ready to replace its first fleets in the area of operations as quickly as possible, but others again to take their places should there be further fighting.

So far as battleships are concerned, this second reserve need not necessarily consist of vessels like the Majestic or Canopus. A smaller type would probably do as well, or better, as the smaller type can be completed more quickly. It is, then, not necessary to suppose that on an outbreak of war we shall want to build big armoured ships, and our estimates may be framed accordingly. Similarly, it may be taken for granted that vessels of less displacement than the

Powerful or with a less amount of armour than the Cressy is to carry will give adequate commerce protection, so long as there are plenty of them.

Reasoning on these lines has led me to believe it unnecessary to look forward to the provision of a fleet of twenty or thirty battleships or belted cruisers, and has decided me in making deductions as to the amount of armour and heavy armament we should require for an emergency programme. In dealing with the matter I have thought it better to take as a basis for my inquiry the smaller programme of the Naval Defence Act of 1887.

Provision of guns.

With regard to the vessels built under this Act and the Acts supplementing it, it is particularly noteworthy in connection with our subject that while there was no marked delay in the provision of armour and armament, the majority of the vessels were not armoured, and few carried any but comparatively light guns. Moreover, while the Royal Sovereign took two years and ten months to build—at that time an unprecedentedly short period—we have since built battleships of greater displacement in about twenty months. Yet it was only by a struggle that the supply of guns was made on that occasion to keep pace with the supply of new ships, when no more than half-a-dozen large ones were in course of construction; it seems likely then that if we had double that number on the stocks, there would necessarily be delay in providing the armament. The conclusion to which we are drawn is, that unless arrangements have recently been made which may be regarded as increasing our sources of supply, it may be expected that, should an emergency arise requiring extraordinary efforts to add to the fleet, the ships and their propelling and auxiliary machinery will be produced in less time than it will take to make guns for them. Of course, these remarks apply exclusively to guns for new ships, and make no allowance for demands that might be made upon the sources of supply in order to repair damages to, or to effect renewal of, armament, such as may reasonably be expected to arise after engagements with the enemy.

With regard to the establishments from which British ships obtain their armaments, the supply of the heavier classes of guns comes from Woolwich and two private firms, Sir W. G. Armstrong, Whitworth and Co., Ltd., and Messrs. Vickers, Sons, and Maxim, Ltd. There are also several firms which furnish smaller classes of guns. It is not, however, with these latter that we need concern ourselves, as it is most unlikely that there would be any scarcity in the types of ordnance which they supply. Nor is it part of my scheme to describe the resources of Woolwich, although it should be noticed that advantages in celerity of production have followed from the

adoption of the wire-wound gun, which can certainly be built quicker than its predecessor. Again, we have, since the days of the Defence Act, considerably reduced the weight of the gun, so far as the heaviest pieces carried by our ships are concerned, and this again will tell in considering the time in which guns can be supplied in an emergency.

Armstrong and Co.

Naturally the great firm of Sir G. W. Armstrong, Whitworth & Co. is looked upon as our principal supplementary arsenal. In case of war it cannot be doubted that all the efforts of this firm would be employed in our service instead of, as is now the case, largely on behalf of foreign governments. And it must be remembered that the progress made, and skill and experience acquired in that direction cannot fail eventually to be to the advantage of this country. Since the days of the Russian War the Armstrong Ordnance Works have been in existence, and even before the amalgamation with Whitworth the company occupied a position in the very forefront of all gun builders. I have been unable to obtain the exact figures as to the gun output of the Armstrong Company per annum.

Vickers and Co.

The firm of Messrs. Vickers, Sons, & Maxim has recently acquired new interest by the purchase of the shipbuilding works and machine shops at Barrow-in-Furness, the capacity of which yard for the building of all vessels from a battleship to a torpedo-boat, I have described in previous articles. In regard to the ordnance works of this firm, very great additions have been lately made, and the Government have placed orders with them for ten 12-in. breech-loader wire guns of the latest design, and they have completed for the Admiralty 6-in. and 4-in. Q.-F. wire guns, as well as other types of breech-loaders, including 9·2, 10 and 13½-in. guns. It will thus be seen that they are capable of manufacturing any size and type of gun. Here again it is difficult to say what number of heavy guns the firm would undertake to turn out in an emergency, but in order to cope with the demand they have considerably enlarged their factories, and are now building shops and laying down plant which will enable them to complete all the ordnance which in ordinary circumstances they are likely to obtain orders for from the Admiralty. As their plant is intended also for the manufacture of guns for vessels built for foreign states at Barrow, it should be found available for extraordinary work for our government if required.

In some respects this section of the subject is still in an incomplete state, because it fails to indicate whether Woolwich and the two firms mentioned could cope with an emergency demand such as has been suggested. What is described, however, will show that since the test of the Naval Defence Act was applied, we

have in many ways increased our resources for producing heavy ordnance.

Reference may be made here in passing to the supply of small arms and ammunition, makers of the former being the Birmingham Small Arms Company, Adderley Park Mills, Birmingham; the London Small Arms Company, Old Ford, E.; and the Henry Rifled Barrel Engineering Company, Blenheim Works, London. The general remarks in this case already made about the guns would probably apply. It is still problematical, however, whether in time of war the present means of output would suffice to meet the demand.

Armour supply.

We now come to the supply of armour plate, by which term I mean everything heavier than that description which is required for those vessels known as "protected." There are four firms which undertake the supply of armour plates, Messrs. Beardmore, Brown, Cammell, and Vickers. Before describing the resources of these four firms it may be as well to give some account of the armour required for a first-class battleship, the method used by the Admiralty to obtain it, the general time taken in delivery, and the precautions by which the Admiralty insure good workmanship. A vessel of the Magnificent type carries the following armour:—

On the citadel	1460 tons
„ barbettes	989 „
„ fore conning tower . .	47 „
„ after conning tower . .	10 „
„ casemates	208 „
„ gun-shields . . .	166 „
Total . . .	2880 tons

But while therefore about 2900 tons is wanted for a ship of the Magnificent type, the Canopus type and those of later date are designed to be protected with a less amount of armour, the increased resisting power of the newer description enabling the constructor to obtain the defence required with a lesser thickness of plating. In addition, however, to her thicker armour the Canopus is further protected by about 125 tons of nickel steel on the bows, and a further quantity of nickel steel is used for the barbette and conning tower roofs, making the quantity of this material about 200 tons per vessel. Judging from past experience, I do not think the whole of this armour for one ship could be delivered in less than from fifteen to sixteen months, working night and day shifts, as all

the makers now do. This is also on the assumption that there is nothing new or novel in the manufacture of the armour involving experiments or new plant. Nevertheless it is to be noted that the makers are more sanguine than my general inquiries lead me to be.

Admiralty acceptance procedure.

The steps taken by the Admiralty to ensure good workmanship appear to be in every way satisfactory. When a contract is placed for the hull and machinery of a ship of war, a dockyard officer of tried experience and probity of character is appointed to supervise the work. He is assisted by a numerous practical staff of highly trained mechanical junior officers, well versed in the details of the various trades employed in the construction of ships and machinery, whose duty it is to satisfy themselves that the materials employed and the workmanship performed are of good quality and will bear the closest scrutiny. As a check upon the result of these inspections the ships, on being delivered at the Royal dockyards, are further subjected to the closest inspection by dockyard officers, and subsequently by Admiralty officials, who, after successful trials, grant certificates to the effect that the specifications and designs and the contract have been faithfully carried out, before the final instalments are paid to the contractors. In addition there is a guarantee by the contractors that they will replace or make good any defects that may be developed or prove due to inferior material or workmanship in the ship or her machinery, extending over the first twelve months that she may be employed on active service.

Much the same procedure is carried out with respect to armour plates and guns, and as regards tests for the former, the Admiralty take the latest and best sample plate as a standard, and all plates made have to give the same tests and be made of the same composition as the sample plate. The present Admiralty condition for 6-inch armour is that a plate, eight feet long by six feet wide, shall resist the impact of four Holtzer steel armour-piercing projectiles weighing a hundred pounds each, fired from a 6-inch gun at the striking velocity of 1960 foot-seconds, without suffering perforation or serious cracking. A fifth shot may be fired at the discretion of the Admiralty officials. At the same time, the Admiralty have and exercise the right of taking any plate made and firing at it, and such plate must give practically the same results as the sample plate that the armour was ordered on. It does not appear that any of these precautions could be safely dispensed with even during an emergency, if the fighting and sea-going efficiency of our ships are to be maintained, because the designs, and in the case of ships the combinations and scantlings of these structures are such that in

order to save weight it is absolutely necessary to ensure the best workmanship in order to obtain the requisite strength and durability.

Capacity of production. Cammell.

Of the four firms mentioned, that of Messrs. Cammell and Co., of the Cyclops Works, Sheffield, was originally established in 1837, and was converted into a limited liability company in 1864. Originally commencing operations in Furnival Street, Sheffield, as file manufacturers, by 1845 the business was so increased that it was decided to remove the plant to a point where the raw material could be more readily received, and the finished work despatched, and four acres of ground, whereon a portion of the present Cyclops Works were built, were leased from the then Duke of Norfolk.

The business of the firm and the works continued to increase so that at the time of the conversion of the former into a limited liability company the latter covered fifteen acres at the Cyclops Works, and it was found necessary to acquire the Yorkshire Steel and Iron Works at Penistone and a large tract of land at Grimesthorpe, a suburb of Sheffield, where the ordnance works now stand. In these last-named works there is in daily use a large hydraulic forging press, capable of exerting a pressure of 6000 tons, and the two overhead travelling cranes which serve this press will lift 150 and 100 tons respectively.

The Siemens-Martin steel plant is also at these works, and the company can deal with forgings and castings of any weight up to 130 tons each. Gun forgings and forged slabs for armour plates are manufactured at these works. At the Cyclops Works are huge rolls for the manufacture of armour plate, the furnaces for Harveying steel, with crucible and Bessemer plants.

The whole of these works give occupation to over 10,000 men, and in addition to the output of mercantile material, the annual capacity of production of warlike material at these establishments is estimated to be :—

	Tons.
Armour plates	8 to 10,000
Forging for guns of all sizes, and marine forgings for all classes of battleships and cruisers	7,500
Projectiles from 3-pounders upwards . .	About 200,000
Steel castings for ships, gun carriages and mountings, roller paths and for land fortifications	2,500
Barrel Steel for small arms . . .	1,000
Bullet proof steel	1,000

The yearly output of armour from Messrs. Cammell's works should therefore be sufficient, in case of emergency, to supply three of the largest battleships, while at the same time providing such steel protection as would be necessary for three first-class and three

second-class cruisers. At the present time they are manufacturing armour for the Albion, Canopus, Glory, Goliath, and Ocean, and also for two cruisers building at Elswick.

Harvey process.

This armour is all of the latest type, but it should be remembered that as the process of plate manufacture has developed by various stages from the original system of rolled wrought iron, subsequently faced with hard steel to break up the shell on impact, and known as the Wilson compound steel-faced armour, to solid steel plates treated by the Harvey and Krupp processes, it has been necessary to make additions to the existing plant, a costly and sometimes a lengthy business.

A short description of the Harvey process will not be out of place here. The system comprises the face carburisation of solid armour and subsequent hardening by a cold water douche. The plate is first manufactured in the same way as ordinary steel armour, that is to say, an ingot of suitable dimensions is forged to a slab under the hydraulic press and afterwards rolled to the requisite thickness. It is then placed in a cementation furnace for carburisation on the exterior surface. The carburisation of the face is essentially an adaptation of the old Sheffield cementation process, whereby the surface of the metal, in contact with charcoal substances and exposed to the application of great heat, extracts a large proportion of carbon from the charcoal coating and consequently becomes much harder than the rear surface of the plate, which has been protected by some non-carboniferous substance. The plate is then bent to the required curve, machined to shape, the bolt holes and face holes drilled, all finished complete to the working templates. When all the machine work is finished, the plate is again reheated and subjected to a final hardening process by sprays of cold water, which give to the plate such extreme density and hardness that, should the officials require any alteration of the shape, this can only be done by the slow process of grinding with the usual grindstone or a specially-prepared emery wheel. Electricity has been requisitioned for the purpose of locally annealing the plates should further drilling be necessary on the surface, but all these are slow and tedious processes, and consequently special care is needed that all particulars are supplied from the dockyard and carried out at the works before the plates are treated to the cold water douche.

This is the Harvey method as generally practised, but Messrs. Cammell claim to have combined with it certain improvements in the manufacture of the armour, and to have patented other processes giving to the plate still greater resisting power than is possessed by the ordinary type of Harveyed armour. Since, however, the

excellent results obtained on the proving-grounds by armour treated on the Krupp process, Messrs. Cammell have added to their works plant enabling them to produce plates made on this system. This firm also supplies specially-tempered nickel-steel plates which are not super-carburised on the surface, as are plates manufactured on the Harvey and Krupp systems; and these having stood the required tests have proved to be particularly well adapted for the secondary defences of battleships, deck-plating, &c.

Altogether Messrs. Cammell have supplied the armour for upwards of two hundred vessels of war.

Brown & Co.

The Atlas Works of Messrs. John Brown and Company, Limited, were originally established in the year 1854, and ten years later were turned into a limited company, with the late Sir John Brown as chairman. On his retirement in 1871 Mr. Ellis was appointed, and from that time has remained chairman of the company.

The Atlas Works took the first licence from Sir Henry Bessemer for his process. Mild steel for shipbuilding was produced there at the earliest period of its introduction into England, and when Siemens steel was introduced a Siemens plant was laid down. The manufacture of armour plates commenced in 1859 with rolled wrought-iron plates, the thickness of these increasing in the course of a few years from 4 in. to 24 in. In 1877 the company began the manufacture of compound armour on Mr. Ellis's patent system, and in 1893 the plant was laid down for supplying armour treated according to the Harvey and Tresidder methods. More recently the Krupp system has also been introduced. The blast furnaces were erected in 1873, and are capable of an output of about 1000 tons per week. Some of the ore used by this firm is supplied by the company's own mines, and the colliery property of the company is very considerable. The number of men employed at the Atlas Works and collieries is about 8000.

Messrs. Brown and Co. have two powerful hydraulic forging-presses which exert from 4000 to 10,000 tons pressure respectively; and it is claimed for the latter that it excels any tool of its kind at present in use. In producing the ingots for armour plates several very large Siemens furnaces are engaged, the ingots when cast weighing from 30 to 50 tons.

As steel armour is now alone used for the protection of battleships and cruisers, and all the heavier plates are super-carburised, the method of manufacture at Messrs. Brown's is very similar to that already described. When cast the ingots are pressed into slabs varying from 20 to 12 in. in thickness, then from the forging-press shop the slabs are conveyed to the armour-plate rolling mill, which

is one of the most powerful in the world. Here, after reheating, they are rolled to finished thicknesses at a single heat. When cold every particle of scale or dirt is thoroughly removed from the face of the plates by a special process, and they are placed in specially constructed furnaces for cementation.

The Krupp process may be described as a series of very elaborate heat treatments, which render possible the application of a modification of the Harvey process to a special kind of steel. In order to carry out these heat processes on such sensitive and delicate material as the one employed, the furnaces require to be specially constructed, and are of a very costly type. Pyrometers have to be kept in use day and night to ensure that the narrow limits of temperature suitable to each treatment are neither fallen short of nor exceeded at any moment, as quite a few degrees Fahrenheit above or below the proper heat (which in itself varies appreciably with the exact chemical constitution of each individual plate) may mean the difference between failure and success. In one process, indeed, not only temperature but time also is of vital importance, and the plate must remain exposed to the heat neither five minutes too long nor five minutes too little if the result is to be satisfactory, and when it is brought out, any delay whatever in getting it under the chilling apparatus will be fatal. In the result, the plate presents a face as hard as glass, while about two-thirds of its thickness from the back inwards is fibrous and tough to a very extraordinary extent, though possessing at the same time high tensile strength.

Messrs. Brown and Co. have recently added to their capacity of output, which at the present time they estimate at about 10,000 tons per annum of heavy armour, similar to that supplied by them for the Hannibal and Cæsar. Calculated in terms of ships, this means practically the same number as Messrs. Cammell believe they can furnish. The output might probably be somewhat less should a large quantity of the armour required consist of casemates, gun-shields, etc., this class of work requiring more time on the finishing machines.

During the last ten years Messrs. Brown and Co. have supplied upwards of 25,000 tons of armour to ships of the British Navy, including most of the recent battleships, such as the Hannibal, Mars, Illustrious, and Cæsar, and this is exclusive of a large quantity of thinner armour for mantlets, communication tubes, etc. During the same period Messrs. Brown and Co. have also supplied the armour for several foreign governments.

Vickers & Co.

Messrs. Vickers, Sons, and Maxim are plate makers as well as gun and ship builders. With the large and new-fashioned machinery

they have in their works at Sheffield they estimate that they are capable of turning out, on an average, 8,500 tons a year of finished armour plates, together with their fittings and everything complete ready for bolting them straight up on the ships they are intended for. They claim that it is only necessary for them to have from ten to twelve weeks' notice before they begin making deliveries, and thus can complete in a year three battleships of the Prince George class, as well as supplying the complete casemate armour for two cruisers of the Niobe class.

The amount of armour-plate material supplied by this firm when large orders were first given was 2600 tons for the year. In 1895 it was 5600 tons, and in 1896 considerably over 6000 tons, while, as has already been said, the new plant now enables them to turn out over 8500 tons a year. The firm claim that in an emergency they could supply the armour for a ship of the Canopus class inside six months, and that at the same time they were completing this armour, they could be going on with the plates for two other ships of the same class, and still get them finished very nearly by the end of the year.

As regards the actual manufacture, the systems employed by Messrs. Vickers are Harvey's and Krupp's; plant for the treatment of plates by the latter process having been laid down and being now in full working. The hydraulic press employed here is capable of working up to 8500 tons or more. In the rolling mill the rolls used are 12 ft. long and 36 in. in diameter, and are powerful enough to allow of a slab 40 in. thick by 11 or 12 ft. wide being rolled down to the required thickness at one heat. The press and the rolls are capable of making from three to four heavy plates a day of an average, say, of twenty-five tons each. There are twelve carburising furnaces in the establishment, each capable of holding two plates, and in these furnaces the plates remain about a fortnight. The average output during 1896 of these furnaces was about two plates a day of an average weight of twenty tons each.

With regard to the works of Messrs. Beardmore I have been unable to obtain much information, but I have been assured that this firm is accustomed to supply plates up to 6 inches thick, and that they have also been increasing their plant and output. They have hydraulic presses of 12,000 and 4000 tons, and machine shops capable of turning out upwards of 300 tons weekly. Beardmore & Co.

If we estimate the output of the three principal firms mentioned above at their own valuation—and there is no reason to suppose that this is overstated—we find that within a period of twelve to fifteen months they are capable of supplying the armour for nine battle-

ships of the largest type, as well as belt armour or plates for the casemates and deck protection of the heaviest cruisers. It is somewhat difficult to reconcile with this claim on the part of the armour manufacturers the statement of the First Lord of the Admiralty, that "at the present moment these firms could not produce so much armour as would justify us in building more ships;" the ships under construction at the time being four in number. The actual fact seems to be that a certain amount of delay in the delivery of plates was caused by the engineering dispute, but that the more important factor is that the systems of manufacture have been almost continuously in a transition stage for the past few years. No sooner was the revolution of the productive plant, caused by the introduction of the Harvey process, accomplished, than fresh and more severe ballistic conditions were imposed, involving still further alterations and additions to plant, and numerous experiments, in order to obtain desired results. It was only natural that these alterations and experiments, with the additions to plant made necessary by the introduction of the Krupp process, should for a time affect the production. But seeing that the difficulties have been overcome, and the plants prepared, there is every reason for believing that the productive power of the country is quite adequate to meet the ordinary demands not only of our own Admiralty, but of British and foreign shipbuilders. As regards Messrs. Beardmore, it may be assumed that this firm will soon be, if it is not already, capable of performing as much work as the others mentioned. It might be suggested, indeed, that the authorities would act wisely in encouraging a fourth company, which already possesses a fine plant, to increase its facilities for the production of armour, especially when Mr. Goschen tells us that this matter is "the key of the whole situation."

Heavy castings.

Intimately connected, of course, with the supply of armour plate is that of heavy castings and forgings, which are supplied by all the firms already mentioned, and also those of Messrs. Thomas Firth and Sons, Limited, Sheffield, and Messrs. Spencer and Sons, Newcastle-on-Tyne.

Messrs. Firth are not manufacturers of finished guns or armour plates, but they are large manufacturers of steel for ordnance, and the material for the celebrated "Woolwich Infant" was made at their works. They have a special process also for making armour-piercing projectiles, which they manufacture in large quantities. Of steel forgings of all descriptions for naval purposes they are able to turn out upwards of 6000 tons per annum, and of projectiles, finished complete, about 800 to 1000 tons per annum. There are a number

of other firms which supply forgings, protected deck platings, and the like, but it is unnecessary to refer to these specifically.

Summary.

To sum up, my inquiries lead me to believe that the present means of supply of guns and armour could not possibly cope with a demand such as was indicated in my emergency programme, and in the time named; our present resources of manufacture being inadequate. It is probable, however, that the plates could be supplied for at least ten battleships building together, and the same number of first-class cruisers; provided, of course, that we monopolised all sources of manufacture. In time of emergency, such as war, we should have to reckon with the possibility that our supply from abroad of raw material, as now used, would be liable to be entirely cut off or seriously reduced. Whether the necessary supply of raw material could be met from British sources aided by scientific methods and research remains an unsolved problem. Past experience is not sufficiently encouraging to justify such an expectation. Though it should not be forgotten that there are mines in this country which in time of stress and with prices ruling much higher than they do at present might be advantageously and profitably worked.

In the foregoing statements of our resources, one point can scarcely escape attention, and this is the small number of firms engaged in gun and armour making as compared with the shipbuilders and machinery manufacturers. I am afraid it is hopeless to expect more from private enterprise in this direction, although from an official point of view doubtless the advent of more firms engaged in the construction of guns and armour would be hailed with satisfaction. But the manufacture of these articles is such a speciality and involves such an enormous outlay of capital that it is not surprising if private enterprise is loath to risk it. Take armour plate manufacture alone, it will be readily understood that the special plant and tools necessary to deal with this quantity of work represent considerable capital expenditure, which is only productive when orders are plentiful, but it is not so generally known that the frequent alteration and improvements to which armour-plate processes are subject put a very short limit on the probable useful life of such plant. As this is not adapted to ordinary manufacturing requirements, much of it has often to be completely dismantled and removed to make room for some newer special appliances.

CHAS. N. ROBINSON.

CHAPTER XI.

Marine Engineering.

In the field of marine engineering, as applied to war vessels, there is little that is original to record of the past year; such progress as has been made being in the direction of perfecting details of existing practice rather than in organising new departures. The three-stage compound, inverted engine is still the almost invariable type, the higher steam pressure now easily secured, not having carried compounding another stage in the Navy; although in the mercantile marine four-stage expansion is met with. The water-tube boiler is still making advances for war vessels, but in the merchant service it gains comparatively little ground.

The trials of H.M.S. Diadem, which took place at the beginning of the present year, are the most important naval engineering incident we have to record in this chapter, and their interest centres in the steam-generating machinery. In last year's *Annual* we gave a description of the Belleville boiler and referred to the fact that an economiser was being added to it for some vessels then in course of construction for the Royal Navy. The economiser type of Belleville boiler might be described as a compound, or two-stage steam generator. On page 217, Fig. 1, we give an illustration of this form of steam generator which is taken from a recent work, by permission of the author and publishers.* It will be seen that there is a Belleville boiler of ordinary design, excepting that the number of lengths of tube in the elements is lessened. This, naturally, results in a reduction of the heating surface so far as the boiler proper is concerned. Above the steam generating elements, where the uptake would ordinarily be, there is, within the smoke jacket or casing, a large space, designed to act as a combustion chamber, which is from four to five feet high. Again, above this the casing is extended upwards, and within the space thus provided there are placed other elements, or series of zig-zag pipes, joined by boxes and arranged substantially in the same manner as the elements of the boiler proper. These elements of the upper storey constitute the economiser. The tubes forming the latter are of smaller diameter

The Belleville boiler economiser.

* 'The Marine Steam Engine.' By the late Richard Sennett and Henry J. Oram. Longmans, Green & Co.

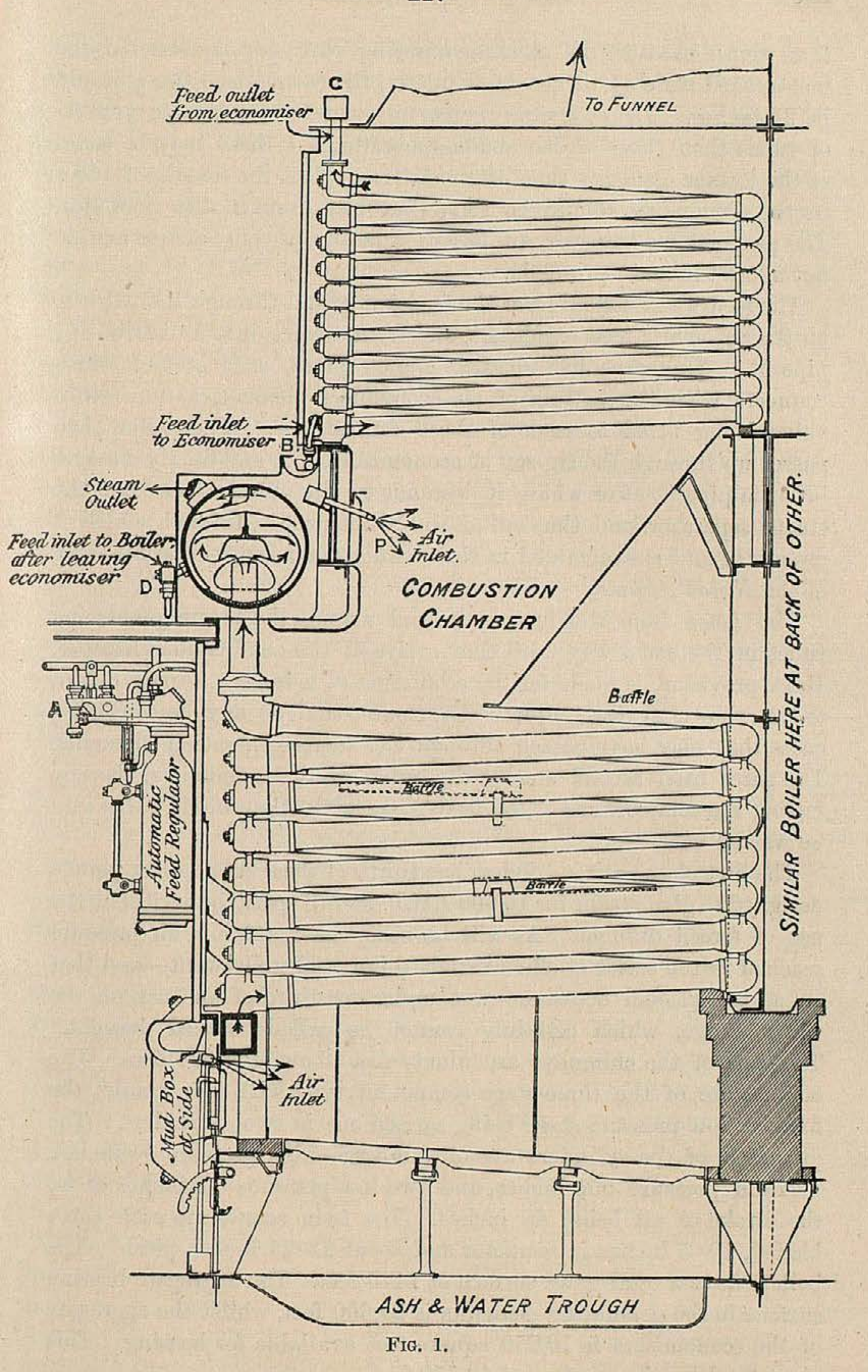

C
Feed outlet from economiser
To Funnel
Feed inlet to Economiser
B
Steam Outlet
Feed inlet to Boiler, after leaving economiser
D
P
Air Inlet.
Combustion Chamber
Similar Boiler here at back of other.
A
Baffle
Automatic Feed Regulator
Air Inlet
Mud Box at Side
Ash & Water Trough

Fig. 1.

than those used in the steam-generating part; for instance, if the last named were $4\frac{1}{2}$ inches in diameter, the economiser tubes would be $2\frac{3}{4}$ inches. The economiser elements may have a greater number of tubes than those of the steam-generator, but there may be fewer of the former elements than of the latter, whilst the length of tubes in the economiser should be somewhat less than in the generator. The proportions, however, are largely a matter of convenience and do not affect the main principle.

The feed-water passes from the feed pump and through the valve A on the automatic feed regulators, and from thence into a distributing pipe B. This pipe has smaller branch pipes, each one of which connects with the bottom of an economiser element, a non-return valve being fitted to each of these connections. The water then passes up through the zig-zag of economiser tubes and finally emerges into the pipe C, after which it descends to the check valve D on the steam separator, and thus enters the boiler proper, through which it circulates and is evaporated in the manner described in the last issue of the *Naval Annual*.

The gases from the furnace ascend among the steam-generating tubes in the usual way until they arrive at the combustion chamber. Here provision is made for the admission of a further supply of air, to, as shown at P, complete the combustion of any unconsumed gases that may have passed through the steam-generating elements. The gases then ascend among the tubes of the economiser, thereby raising the temperature of the feed-water with what would otherwise be wasted heat.

The Diadem's trials.

The first class cruiser Diadem has thirty of these economiser boilers designed to give steam for 16,500 I.H.P. at full speed, but without the use of forced draught. As will be seen, the maximum air pressure reached in the series of official trials this vessel underwent—and that on an exceptional occasion—was under one-third of an inch on the water gauge, which certainly cannot be called "forced draught." The tops of the chimneys are ninety feet above the fire-bars. The engines are of the three-stage compound type with four cranks, the final, or low pressure stage being carried out in two cyclinders. The

Diadem's machinery.

diameters of the cylinders are as follows:—high pressure 34 inches, medium pressure $55\frac{1}{2}$ inches, and two low pressure 64 inches each; the stroke of all being 48 inches. The twin screws are each three bladed, 19·6 inches in diameter and about 22·11 inches pitch. The boilers have a total grate surface of 1440 feet. The aggregate heating surface in the generating elements is 29,600 feet, whilst the aggregate of the economisers is 10,950 square feet available for heating. This gives total heating surface of 40,550 feet.

The Diadem was subjected to a series of trials more than usually protracted, partly with a view to discover her speed qualities, she being a vessel of a new type, but more especially to determine the value of the new type of boiler. Before going into details, it may be said that the trials indicate a distinct advance in steam generation. Engineers cannot help regretting, however, that some more satisfactory method of arriving at the boiler efficiency was not employed than that of estimating it by the aid of indicator diagrams. The steam-engine indicator itself is by no means an instrument of accurate measurement, and, when to this is added the uncertainty as to engine efficiency, the boiler co-efficients surmised are not all that can be desired. The difficulties in the way of measuring feed-water on board ship are undeniably great. By the old tank system they would be so serious as to put them out of the question for trial-trip purposes. It has, however, been shown by steam-engine trials, carried out by the Institution of Mechanical Engineers, that water-meters are fairly trustworthy; but whether even the smaller complication due to the use of meters would be admissible in the case of a Belleville boiler installation, with all its devices and special fittings for feed control, is a matter which is certainly open to consideration. At any rate, the water-meter, even with its possible error, would be a more satisfactory instrument for determining boiler efficiency than the indicator.

Land trials of Belleville boilers.

The Admiralty engineering authorities are evidently fully alive to this, for they have taken the trouble to make special evaporation tests with one Belleville economiser-boiler erected on shore for the purpose. The results of these trials are given by Mr. Oram in the admirable book already referred to, which is based on the late Mr. Sennett's well-known work. We quote the results of one trial from this source. With a boiler having a total ratio of heating surface to grate surface of 32·7 to 1, when burning 24½ lbs. of coal per square foot of grate per hour, the equivalent evaporation was at the rate of 11·6 lbs. of water from and at a temperature of 212° Fahr. per lb. of good, hand-picked Welsh coal per hour, on an eight hours' trial. The steam pressure in the boiler was 215 lbs. per square inch, the actual evaporation of water into dry steam was 7·23 lbs. per foot of total heating surface, and the steam produced was 235·7 lbs. per square foot of grate. The temperature of the feed-water was 68° Fahr., and the temperature of the steam leaving the economiser was 250° Fahr. The temperature of the products of combustion between the generator and the economiser (*i.e.*, in the combustion chamber) was 1112° Fahr., and after they had passed through the economiser tubes and reached the base of the funnel it was 518° Fahr.

Diadem's trials.

Turning now to the data published of the Diadem's trials, which are of greater value by reason of the shore trials just quoted, we find very full accounts given in *Engineering*. From these it appears that seven trials were made in all. The first was a thirty hours' low-speed run, with only a little over a fourth of the full boiler capacity in operation, and about a fifth of the maximum power developed. The coal consumption was high: 2·18 lbs. of coal per I.H.P. per hour. For the purpose of showing the efficiency of the boilers the test was useless, and evidently it was not undertaken with this view. If only one set of engines had been worked, more satisfactory engineering results would have been obtained; for the cylinder space was a great deal too large for the steam available to fill it. The speed of the ship was 12¾ knots. The next trial was also of thirty hours' duration, and on this occasion the whole of the boilers were in operation, but the engines were run to no more than 75 per cent. of their maximum power, or about 13,000 I.H.P. On this run the best fuel economy was obtained, the coal per I.H.P. per hour being 1·59 lbs. The initial pressure in the engines was 241 lbs. per square inch. These boilers are designed to carry a pressure of 300 lbs., but this is intended to be brought, by a reducing valve, to about 250 lbs. as a maximum. The rate of fuel consumption was 14·33 lbs. per square foot of grate per hour. The total I.H.P. per square foot of grate was 8·87, and the heating surface per I.H.P. was 3·17 square feet. The result was decidedly good considering the fact that an unrecorded amount of steam was used by auxiliary engines, as is always the case on Admiralty trials. The speed was about 19¾ knots.

Speed trial.

The eight hours' full-power trial was run on January 26th, when naturally all the boilers were in use. The I.H.P. developed was 17,188, the initial steam pressure in the engines being 245 lbs. The coal consumed per I.H.P. per hour was 1·77 lbs., there being burnt 21·14 lbs. of coal per square foot of grate per hour. The total I.H.P. per square foot of grate was 11·93 lbs., whilst the total heating surface per I.H.P. per hour was 2·36 square feet. The revolutions were 119·1 per minute, and the speed was 20·6 knots, as a mean of three runs over a course of 22·8 nautical miles. The first two runs were made in exactly the same time, whilst the third took a longer time and was against "a very preceptible tide." It is argued from this that the ship made the two first runs in slack water, the tide neither helping nor retarding, but the assumption is not necessarily borne out by the facts quoted. The ship may have started on the later part of the flood, finished her first run at the turn of the tide, and taken the first of the ebb back. That would have given her two runs with tide and one against it. Probably, however, the speed was

at least as good as that quoted, and in any case the performance is an admirable one. It would be desirable, however, in order to avoid doubt in these speed trials, to select a day and a course when trial-runs could be made on the middle of one tide, and the mean speed on the eight hours be determined by the revolutions from data thus obtained.

The next trial, made on January 29th, was one of great interest from an engineering point of view; although, being only four hours in duration, it was shorter than could be desired for the purpose of determining fuel economy. That, however, was not the main end of this trial; the chief object being to find the effect of working with a higher ratio of engine-power to boiler capacity. Only 31,660 square feet of heating surface and 1124 square feet of grate surface were in use, 24 boilers only out of the 30 being lit. The air-pressure for blast was 0·3 in. on the water gauge. Under these conditions the initial steam-pressure at the engines was 235 lbs. per square inch, and 15,861 I.H.P. were developed, the coal burnt being 1·95 lbs. per I.H.P. per hour. The rate of combustion was 27·52 lbs. per square foot of grate per hour. The horse-power per square foot of grate was 14·11, and each 1·99 square feet of heating-surface gave one horse-power. The rate of evaporation must have been high with a fuel economy at least respectable on this trial, and there can be no doubt that the economiser, when new and clean at any rate, merits its name so far as fuel is concerned. It will be remembered that the Terrible, with ordinary Belleville boilers, burnt on a coal trial, when fuel economy is especially aimed at, 1·71 lbs. per I.H.P. per hour, a consumption which may be compared with the 1·77 lbs. of the Diadem; but the figure for the latter is taken from her full-speed record, when coal-saving is usually cast to the winds.

Trial with twenty-four boilers in use.

The increase in economy has apparently been reached not only without adding to the boiler weights, but is even attended by a slight gain in this direction. According to *Engineering* the following are the Diadem's machinery weights:—

Weight of machinery

Machinery	575 tons
Shafts and propellers . .	112 „
In Boiler Room . . .	750 „
Auxiliary Machinery . .	83 „
	1520 „

The Powerful's boiler-room weights were 1184 tons, which gave 22·24 horse-power to each ton. The corresponding figures for the Diadem would be 22·91 units of power developed for each ton

weight in the boiler-rooms. If we assume that the weights given in both cases include corresponding items, as doubtless they do, it would appear that between ½ and ¾ of a horse-power is gained in the Diadem, as compared to the Powerful, for each ton weight appropriated to boilers. This may be due to saving made by modification in design or the use of lighter materials.

Messrs. Yarrow's new boiler.

In the last issue of the *Naval Annual* we pointed out some of the reasons why an economiser is preferable to an extension of ordinary heating-surface in a boiler—especially a water-tube boiler—the chief

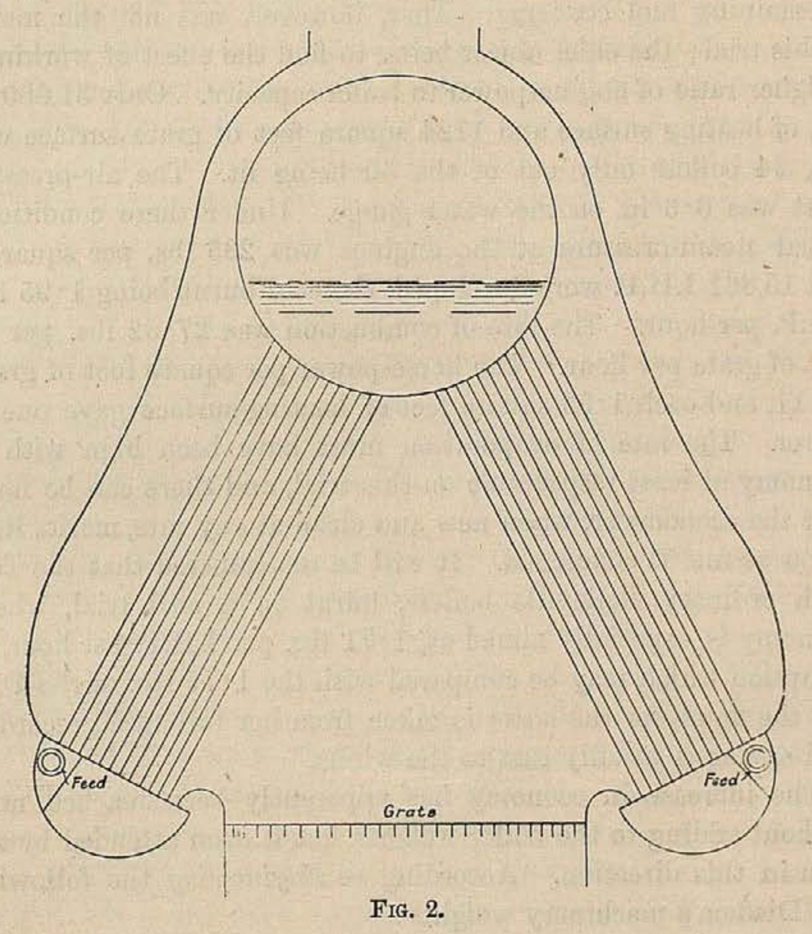


Fig. 2.

one being that the hottest gases should be brought in contact with the hottest water, and *vice versâ*. Thus, if one wished to generate steam in a long straight pipe, one would make the water and the furnace gases flow in opposite directions, because the cold incoming feed-water would be able to take the last of the heat from the escaping gases, whereas the hot steam could not do so. During the past year Messrs. Yarrow & Co. have brought forward an ingenious application of this principle, which promises to add considerably to the fuel economy of their express type of boiler, and also to have other incidental advantages. In the illustration (Fig. 2) is shown in

diagramatic form a Yarrow boiler which is but slightly altered from the ordinary construction. It will be seen that in each lower or wing-chamber there is a partition which separates one corner of the chamber from the remaining space. The tubes of the outer row lead from this divided off part, and into it the feed is introduced. The cold water thus circulates first through the row of tubes against which the gases last impinge before they pass to the chimney. The effect in reducing the temperature of the escaping gases, and thus adding to economy, is somewhat striking. For instance, if a boiler-pressure of 250 lbs. to the square inch were used, the temperature in the outer rows of tubes would be, say, 406° Fahr., if they formed part of the general circulation, as in the old system. If the escaping gases

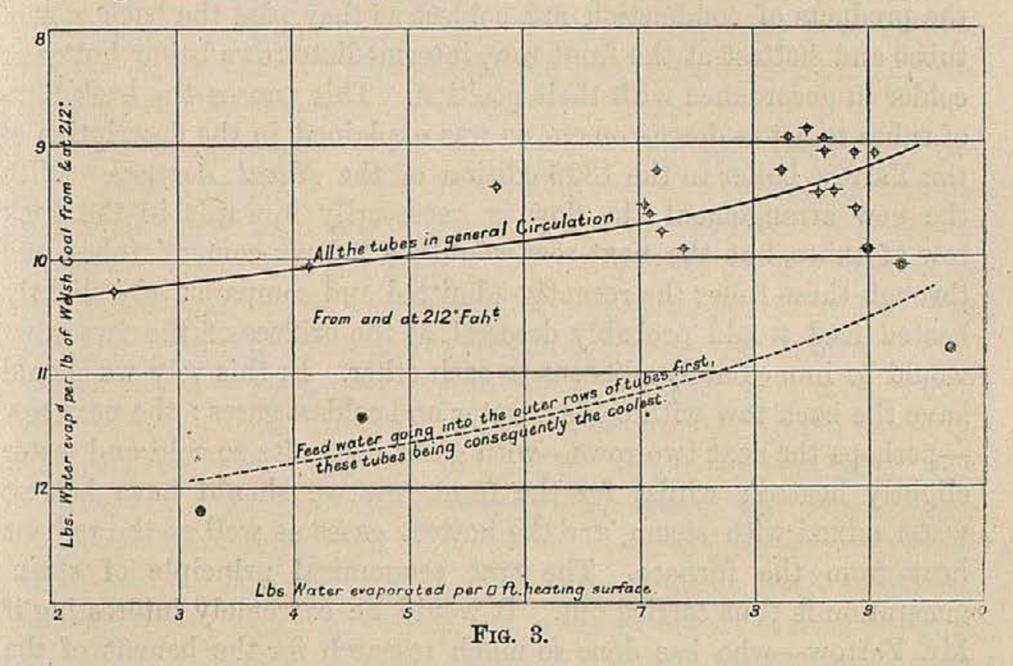


FIG. 3.

had a temperature of 700° the difference would be 294°, whilst if the outer rows of tubes contained water at, say, 200°, there would be a difference between the temperature of the tubes and the gases as they first strike the tubes of 500°. The economy due to this simple change in design is shown by the curves on the accompanying diagram (Fig. 3). These have been plotted on the results of trials carried out by Messrs. Yarrow & Co. The amount of water evaporated per lb. of coal burnt and per foot of total heating-surface is indicated by the dotted line in the case where the boiler was worked under the new conditions, and by the continuous line when it was tried after being altered on the old plan.

Messrs. Yarrow's device is in effect a feed-water heater, acting in a manner similar to that of the Belleville economiser, but it possesses some advantages over the latter. In the first place, the economiser

tubes—we will use the same wording in both cases—are not liable to get empty with the Yarrow device, because they are "drowned"—that is, have always water over them in the top drum. In the Belleville arrangement, if the economiser elements were to become empty through the failure of the feed-pumps or otherwise, the tubes would speedily get burnt. It is for this reason that the feed-water is introduced at the bottom end of the economiser; whereas, in order to get the best heating effect, it would be desirable to pump into the top end of the elements, so as to bring the coldest water and coldest gases together.

Yarrow economiser.

The Yarrow economiser lends itself very conveniently to the carrying out of the cold feed and cold gases principle. Naturally the products of combustion are coldest as they pass the back row of tubes and hottest at the front row, intermediate rows being hotter or colder in accordance with their position. This causes the back rows of tubes to act as down-comers, as was explained in the description of the Yarrow boiler in the 1896 edition of the *Naval Annual*. With the new arrangement the flow is necessarily upwards in the back row of tubes, but the next row would be "down-comer" tubes, and through these tubes the recently-admitted and comparatively slightly heated feed would probably descend, as the orifices of the two rows would be immediately adjacent to each other. In this way we should have the back row with coldest water and coldest gases; the next row—perhaps the next two rows—with gases not quite so cold and water slightly heated; whilst for the front row we should have hottest water mixed with steam, and the hottest gases as well as the radiant heat from the furnace. The true economical principle of steam generation is thus carried out. It would be extremely interesting if Mr. Yarrow—who has done so much research for the benefit of the engineering profession—would make some experiments to find the temperature of various rows of tubes respectively. The invention of the Le Chatelier pyrometer makes this quite possible, but it would involve a troublesome and somewhat costly series of experiments.

Turning once more to the Belleville boiler as now made, we find that with the economiser the heating of the water is carried out in two stages, but in neither of these, taken separately, is the flow of water in regard to the flow of gases well arranged. Still the addition of the economiser is, as has been said before, a great improvement. The arrangement of the combustion chamber is, perhaps, a little more open to doubt. It may be questioned whether the space could not be better utilised by raising the generator elements bodily, thus placing the combustion chamber immediately above the fire; or, in other words, giving a high fire-box, in place of both a low fire-box

and a combustion chamber. What is needed for perfect combustion is space in which to burn the gases, and there was far too little of that in the old Belleville boiler. The pneumatic stirrer is an ingenious device introduced to overcome this defect; in fact, the boiler is distinguished by ingenious devices introduced to overcome natural defects. It is better, whenever possible, to burn the gases in the fire-box, where they are distilled from the coal, and where they are subject to the radiant heat of the whole mass of burning fuel, rather than to let them escape unconsumed amongst the tubes of the generator elements, where they may be sufficiently deprived of their heat to bring them below the temperature needed for combustion. It is useless mixing air in a so-called "combustion chamber" with gases in such a state; and it must be remembered that gases unburnt are not only wasted in themselves, but that they absorb heat in their distillation, and this is likewise carried to waste.

River gunboats.

The river gunboats which have been completed during the past year have brought forward some features of engineering interest which are new, or at least unusual, in naval practice. The need of shallow-draught fighting vessels has often been experienced in our military operations in new countries, and is likely to be still more felt in the future. The early boats, which did such excellent service in Africa, have been mostly stern-wheel vessels; such craft, with a few guns added, as are usually employed for trading on rivers, the navigational possibilities of which have not been developed. The paddle-wheel at the stern—which, by-the-by, was the original position of the wheel—is ill-adapted for fighting purposes. It necessitates the machinery being on deck, and the wheel itself is entirely exposed. Moreover, screw engines, running faster, should be lighter and more efficient than paddle engines. In order to meet these points, Messrs. Thornycroft & Co., of Chiswick, built in 1885 five shallow-draught boats. These were intended to take part in the ill-fated expedition for the relief of Gordon, but they were not ordered soon enough to be of use. They had twin turbine-propellers, an invention of Mr. Thornycroft, by which high power can be obtained on a light draught. The screw works in conjunction with a series of guide-blades, as will be fully explained later; and though the efficiency of this propeller is high, it possesses the disadvantage of not being able to propel the vessel astern excepting in a slow and inefficient manner. In order to overcome this drawback a supplemental screw of ordinary form has been added, it being placed on the shaft in front of the turbine-screw, as shown in Fig. 6. This has been so far effective that in the new boats about to be described a speed astern of $4\frac{3}{4}$ miles per hour has been attained.

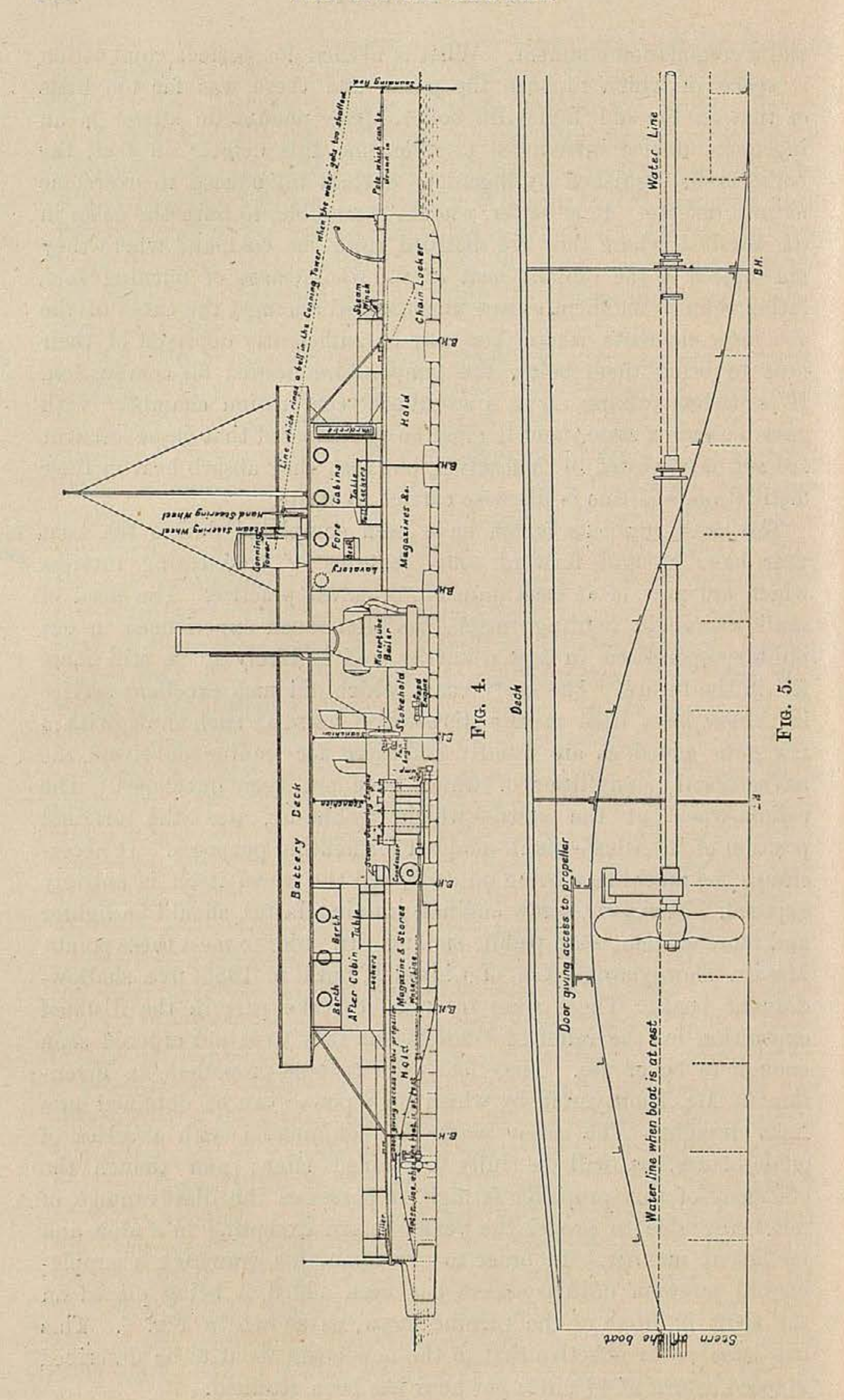

Battery Deck
After Cabin
Berth
Table
Lockers
Magazine & Stores
Hold
Stokehold
Water tube Boiler
Lavatory
Fore Cabins
Magazines &c.
Hold
Chain Locker
Steam Winch
Conning Tower
Hand Steering Wheel
Steam Steering Wheel
B.H.
Line which rings a bell in the Conning Tower when the water gets too shallow
Pole which can be drawn in
Deck
Water Line
Door giving access to propeller
Water line when boat is at rest
Stern of the boat
B.H.

FIG. 4.

FIG. 5.

The light-draught gunboats just completed, have been built on the Thames for our own and the Egyptian Governments respectively. A longitudinal section of one of these vessels is shown in Fig. 4, while an enlarged view of the after-part is given in Fig. 5. These engravings represent the Heron and the Jackdaw built for the Royal Navy by Messrs. Yarrow & Co., of Poplar. Each boat is 100 ft. long and 20 ft. wide, the maximum specified draught of water, with coal, armament, and other equipment on board, being 2 ft. There are two screws, the arrangement of which will be referred to later, as that constitutes the special shallow-draught feature of the vessels. The engines are of the ordinary three-stage compound type, having cylinders 8 in., 12 in,. and 17½ in. by 9 in. stroke, and there is one water-tube boiler, the maximum working pressure being 200 lbs. to the square inch. On the official trial the guaranteed speed of 9 knots was reached with 140 lbs. of steam and 320 revolutions. A larger vessel, built for the Egyptian government by the same firm, made over 13 statute miles an hour, or 11·4 knots, on her trial trip, with about 473 I.H.P., the draught of water being no more than 2 ft. with a 35-tons load on board. She is 145 feet long by 24 ft. 6 in. wide, and 6 ft. deep. Another vessel of the same length and breadth built by Messrs. Thornycroft, has also been tried during the past year. With the same dead-weight load on board, namely, 35 tons, she made 12·14 knots as a mean of six runs, and 11·97 for two hours with 453 I.H.P. and 281 revolutions.

The propellers and the position they occupy are the chief features of interest in these boats. It is evident that to utilize the power developed in either boat with two screws of 2 ft. diameter would be out of the question. Fig. 5 shows the method Messrs. Yarrow adopted to overcome the difficulty. It will be seen that the bottom plating at the stern is bent up so that an inverted trough or tunnel is made, the crown of which, at its highest part, is considerably above the normal still-water plane with the vessel at rest. The screw is therefore, as shown, not much more than half immersed, a position which, it is needless to say, would be most undesirable under ordinary circumstances. In this case, however, upon the engines being started, the air which may be in the tunnel when the vessel is at rest is quickly driven out by the propeller causing a rush of water, so that the whole of the tunnel at once becomes filled with water, thus entirely immersing the screw. It will be seen that the bottom edges of the tunnel are entirely under water all round, so that when the boat stops, the water level in the tunnel does not fall to that of the surrounding river until air has leaked through or otherwise accumulated in the crown of the tunnel. The partial vacuum

in the tunnel will hold for a considerable time; we believe, under favourable conditions, for from two to three hours.

The screw turbine propeller.

The boats built by Messrs. Thornycroft & Co. are propelled by the twin-screw turbine, and though this is not altogether a new invention, it is so little known that the accompanying illustration, Fig. 6, which we take from *Engineering*, and a brief description, will not be out of place. The engraving shows a view of a half-model. The supplemental screw for going astern, already mentioned, is not an integral part of the arrangement, and need not be referred to in this description. The whole device consists of a short cylinder which is fixed to the boat and has an axis in common with the propeller shaft. Within the forward part of this cylinder the moving part, or propeller, revolves. The boss of the propeller at the forward end is of small diameter, but enlarges considerably as it goes aft. The boss

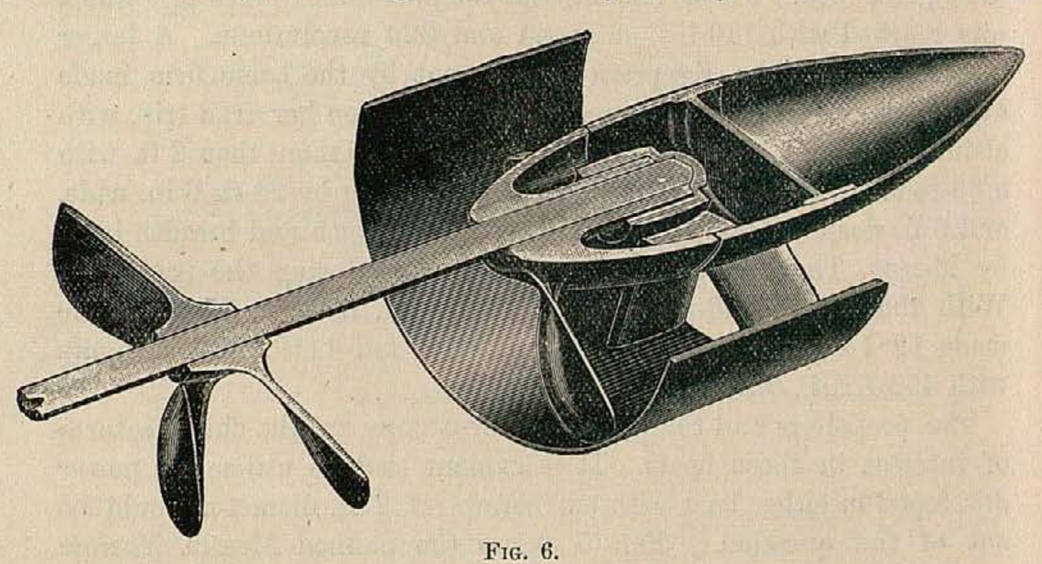


Fig. 6.

like the rest, is shown in section; the model from which the engraving was taken being cut in halves. The back part of the cylinder contains the fixed guide blades, of which two can be seen in Fig. 6. The long, tapering body projecting astern is merely for causing the water to flow away in easy lines, and thus prevent the eddy-making, which would result from the square after-part of the propeller boss. It must be understood that the propeller and its boss are alone revolved by the shaft. The tapering after-body, the cylinder, and the guide-blades are stationary. The line of division between the boss and the tapering body is plainly shown in the engraving. It will be seen that the increasing diameter of the boss has the effect of narrowing the section available for the passage of water impelled through the cylinder by the propeller blades. The pitch of the forward edge of the blades multiplied by the revolutions is approxi-

mately equal to the velocity with which the water enters the cylinder, owing to the forward movement of the boat; that is to say, no impulse is given to the water at first. As the available area for flow is reduced by the enlarging of the boss, the water naturally has to increase in velocity, and the pitch of the blades is also increased proportionately, and the water is therefore discharged from the propeller with increased acceleration, and also with a considerable rotary motion. It then enters the part of the cylinder where the guide-blades are fixed, the function of the latter being to direct the motion of the water into lines directly aft. The rotation of the race is thus destroyed, the motion being converted into propulsive effect.

Efficiency of screws placed beneath.

With both vessels the screws were placed in tunnels in the manner illustrated, and there is an incidental advantage common to both which has more than once proved of great convenience in navigating unsurveyed rivers with shifting beds, uncertain shallows, and floating obstructions. By removing a cover placed on the top of the trough, as shown in the engraving, direct access can be had to the propeller, which can thus be removed, or repaired in position as may be required. The screw being placed under the bottom of the boat enables it to be worked much nearer the surface of the water by which it is immersed. In the present case, it will be seen by reference to Fig. 5 that the blade tip only just clears the bottom skin of the vessel, which is here also the water level. If it were to be attempted to work a screw placed in the ordinary way so near the surface, there would be a great loss of efficiency. As the blades of a propeller revolve the water has to follow up, otherwise there would be a space void of water at the back of each blade. The speed with which the water can follow depends on the head of water over the screw, or depth of immersion, so that with a quickly revolving screw, or one with a high peripheral speed, the immersion should be comparatively great. This matter is referred to at greater length presently, in dealing with Mr. Parsons' experiments. If the tips of the blades approach too near the surface, air will be drawn down to the back of the blades, and it has been found by experiment that efficiency can be largely reduced in this way. Mr. Barnaby, in his work on the screw propeller, gives an interesting diagram illustrating the point. It is evident that air will not be drawn down through a steel plate, and therefore the blade tips can, in the vessel illustrated, come near the surface without reducing efficiency.

General arrangement of the Heron.

The general arrangement of the Heron is well shown in the profile view, Fig. 4. Although it does not come within the province of this chapter, it may be useful to state here that the armament of the Heron and her sister craft consists of two 6-pounder quick-firing guns,

and six Maxim automatic rifle-calibre guns, all being on the upper or battery deck. The larger Egyptian boats have two 12-pr. quick-firing guns mounted at each end of the upper deck, a howitzer on the main deck, and several automatic guns of 0·45 in. calibre. These vessels are divided into eleven separate sections which are each floatable, and can be bolted together when afloat by an ingenious arrangement. This makes the vessels easily transportable and does away with the necessity for erecting them on land and then launching the vessel complete—a task of no small difficulty in a new country. The material of which they are constructed is chrome steel and ordinary mild steel. The machinery is placed in two separate compartments, one constituting the engine-room and the other the boiler-room. These are constructed of chrome steel plating 3-16 in. thick. This very costly material has a tensile strength of about three times that of ordinary mild steel, it being 95 tons to the square inch with an extension of 5 per cent. on 2-in. The 3-16-in. chrome steel equals in protective efficiency about half an inch of ordinary mild steel, and will stop a Lee-Metford bullet fired point-blank at twenty paces. The quality of hardness it possesses would not be an unmixed advantage in a sea-going vessel, as the ductility of the milder steel is not present. The superstructure is also largely formed of chrome steel for protective purposes.

Liquid fuel.

The application of liquid fuel for small war craft has been the subject of enquiry by the naval engineering authorities of several Powers during the last year or two, and has resulted in provision being made for the use of this auxiliary to quick steaming. In the case of larger vessels also it is contemplated to use it in some cases. A notable instance is the big Russian cruiser Rossia which has oil-burning apparatus on the furnaces of her Belleville boilers. A good many trials have been made, but the results have been so far kept secret that our stock of knowledge in practical details has not been increased. The system adopted by Mr. Holden for firing locomotives on the Great Eastern Railway appears to be the most convenient. In this the ordinary fire-bars are fitted and a thin fire of coal or coke is kept on the grate. The liquid fuel is sprayed into the fire-box above the coal fire by a steam jet, and burns in the usual way. So long as the oil supply is kept up, the coal or coke wastes very little. The writer made the trip from London to Harwich on the foot plate of the locomotive of the Continental express, the liquid fuel apparatus being in use, and no more than half-a-dozen shovel-fulls of coal were put in the furnace during the run; just sufficient to stop up holes where the fire wore thin and was letting too much air through. With the Holden system coal alone can be used

in case the stock of liquid fuel runs short—an immense advantage in war time. Messrs. Thornycroft have adopted the same system in one of their vessels.

The objection to the steam jet afloat is that it wastes fresh water, and for this reason Messrs. Doxford used jets of compressed air in the torpedo boat they built some time ago, and which was fired exclusively with liquid fuel. This boat worked admirably. In a paper on the subject read before the North East Coast Institution of Engineers and Shipbuilders, Mr. R. Wallis gave the results of his experience with the use of liquid fuel afloat. He has found that air under pressure, especially if heated, will produce good results, but the flame is shorter, giving a more intense heat for a short distance than the flame from a steam sprayer. Air is more noisy than steam, and there is danger, unless care be taken, of an explosion of oil gas in the furnace when lighting up. Steam for spraying is said to be more economical than air, and the general arrangement is simpler, so that there is less liability to breakdown. The result obtained by several experimenters that the average evaporation of liquid fuel is twice that of coal was confirmed by Mr. Wallis' experiments. They were made principally with petroleum residues, and included the trials of various sprayers. The paper is most interesting, and is well worthy of perusal by marine engineers. It is published in the Transactions of the Institution.

The steam turbine.

In the last issue of the *Naval Annual* brief reference was made to the Turbinia. Since then this remarkable little vessel has been more prominently before the public, chiefly in connection with the great Naval Review of last summer. The writer has been able to make one or two runs on her at full speed, and has concluded that the claims made for her as to speed and freedom from vibration were by no means exaggerated. In a paper read by Mr. Parsons at the Spring Meeting of the Institution of Naval Architects, additional particulars were given of the boat; but as these are recorded in the Transactions of the Institution, it is not necessary they should be repeated at length here, more especially as we gave the leading figures last year. It is satisfactory to know that the Admiralty have ordered from Mr. Parsons' company a boat of the destroyer type, which is to serve as an experimental craft. Particulars of this vessel have not been made public at the time of writing, but it is said that the guaranteed speed is 31 knots, and that she will be of greater length than any of the destroyers yet built, but with a ratio of breadth less than that usually apportioned to these vessels. Her displacement will approximate to that of the largest and most recent. If these particulars are accurate, there can be no doubt that Mr. Parsons will far exceed his guarantee

in regard to speed, if we may take a line through the Turbinia, for 31 knots would not be excessive for a vessel of the length with ordinary machinery. It is said that a similar vessel is also to be put in hand for a foreign Power. Probably 35 or 36 knots will be reached, if not exceeded, by one or both of these vessels. Mr. Parsons has had some difficulty in dealing with steaming astern. The steam turbine can only be rotated in one direction, and therefore for reversing the motion of the boat a special turbine has to be fitted. In the Turbinia this took the form of a supplementary set of blades and guides set reversely, and placed inside one of the ordinary turbines, the steam being shut off from the latter and admitted to the former when it was required to go astern. It was, however, in contemplation to fit a separate go-astern turbine in future vessels. The Turbinia has, we are informed, steamed astern at about 7 knots, and has been brought up to 30 knots' speed from being still in the space of half a minute, whilst she has been stopped entirely when travelling at that speed in thirty-seven seconds.

High-speed screws.

In Mr. Parsons' paper above referred to, details of some important experiments on screws were given. The steam turbine in the Turbinia to be efficient had to run at a very high rate of turning—over 2,000 revolutions a minute. This made the screw problem one of exceptional difficulty, and it will be remembered that the Turbinia had nine screws : three on each of her three shafts. Even with the small diameter thus made possible, the danger of loss in efficiency due to cavitation became a serious matter, and in order to gain information on this point the experiments in question were carried out.

Cavitation.

It will be as well first to explain what "cavitation" is, it being a newly discovered propeller disease, the credit for first diagnosing which is due to Mr. J. I. Thornycroft and Mr. S. W. Barnaby, who put the matter forward in a paper upon torpedo-boat destroyers contributed by them to the Transactions of the Institution of Civil Engineers in 1895. Mr. Barnaby has since supplemented the information then given by a paper read before the International Congress of Naval Architects and Marine Engineers held in London last summer. It has already been said that when a screw revolves with extreme rapidity the water may not follow up quickly enough to keep in contact with the back of the blades, and there will be a tendency to form a vacuum. The rapidity with which the water can follow the screw blades in their rotation is dependent on the head of water above them, as already stated, in addition to which there is, of course, the atmospheric pressure on the surface of the water. The problem of cavitation is independent of the drawing down of air to which reference has already been made, although the same causes

may contribute to both defects. The tendency to form the vacuum at the back of the blades is counteracted by the fact that ebullition occurs *in vacuo* at ordinary temperatures, so that if the water cannot follow up fast enough its place is taken by vapour.

Mr. Parsons found, by means of a spring torsional dynamometer, that in the Turbinia, his screws were absorbing a great deal more power than they should have done for the effect they gave out in propelling the boats. In order to trace this propeller defect to its first cause, which he suspected was cavitation, he had model screws made and ran them in a bath of water heated to within a few degrees of boiling-point, taking care that the temperature of the water, the head of water above the propeller, and the speed of revolution should give a close resemblance to the actual conditions of work in the real screw. It will be known to the majority of the readers of the *Naval Annual* that water heated to just on the boiling-point at any given pressure will flash into steam on the pressure being relieved. Thus, if an ordinary boiler contain water and steam at, say, 200 lb. pressure, if the boiler suddenly burst the water will at once become steam; whilst if water at the boiling-point at atmospheric pressure (212°) were suddenly placed under the receiver of an air-pump, it would likewise flash into steam.

Mr. Parsons' object in heating the water was to cause ebullition to take place under conditions less extreme than would have been needed had the water been cold; or, to use his own words, "to obtain an increased vapour pressure from the water so as to permit a representation of the conditions with a more convenient speed of revolution." The screw experimented upon was illuminated by light from an arc lamp reflected from a revolving mirror attached to the screw-shaft, the light falling on one point only of the revolution, so that the shape, form, and growth of the cavities could be as clearly seen and traced as if stationary. "It appeared," the paper says, "that a cavity or blister first formed a little behind the leading edge and near the tip of the blade; then, as the speed of revolution was increased, it enlarged in all directions until, at a speed corresponding to that in the Turbinia's propeller, it had grown so as to cover a sector of the screw disc of 90°. When the speed was still further increased, the screw, as a whole, revolved in a cylindrical cavity, from one end of which the blades scraped off layers of solid water, delivering them on to the other. In this extreme case nearly the whole energy of the screw was expended in maintaining this vacuous space. It also appeared that when the cavity had grown to be a little larger than the width of the blade, the leading edge acted like a wedge, the forward side of the edge giving negative thrust." This

graphic description of the phenomena observed, and the ingenuity of the experiment, remind one forcibly of some of the late Mr. Froude's beautiful work. The importance of the investigation to those engaged in high-speed propulsion can hardly be overrated. The conclusions finally expressed in the paper were, "that in all screws of whatever slip ratio, there will be a limiting speed of blade depending upon the slip ratio and the curvature of the back. . . . Beyond this speed a great loss of power will occur; and that should the speed of ships be still further increased, the adoption of somewhat larger pitch ratios than those at present usual will be found desirable."

G. R. Dunell.

CHAPTER XII.

The Position of the British Navy in 1898.

As an old financial officer of the Admiralty, it is natural to look to the expenditure of the several Powers as the measure of their strength and the clearest indication of their Naval policy. The Navy Estimates for 1898 of the three principal Naval Powers are, in round figures, as follows:— Naval expenditure.

Great Britain	£23,780,000
France	11,400,000
Russia	7,070,000

The expenditure on the British Navy exceeds that of France and Russia combined by over five millions sterling.

Limiting our view to the votes for shipbuilding, it will be interesting to trace the movement in recent years under the powerful influence of the public Press. When the present writer first entered Parliament a listless apathy prevailed on Naval affairs. France had been struck down by a disastrous war, and little effort was required on our part to maintain a leading position. In 1870–71 the expenditure on new construction for Great Britain was £1,330,000, as against £412,000 in France. In 1877–78, in the anxious period of the Russo-Turkish War, our expenditure on new construction and the purchase of ships amounted to £2,922,000, as against £1,502,000 for the French Navy. In 1878–79 a sudden contraction brought the British expenditure to a level with that of France, the total in each country being slightly in excess of one and a half millions sterling. In 1883–84 our votes for new construction exceeded the French by £400,000, and in the following year by £730,000. In later years we have made great efforts. Public opinion was first aroused by Mr. Stead and his colleagues in the Press. The impression has been deepened through the historical demonstration by Captain Mahan of the great part which the British Navy has filled in the making of the Empire, and maintaining it secure from attack. In 1885–86 the British votes for new construction were £3,737,000, as against £1,335,000 for the French Navy. During the thirteen years which have since elapsed, we have pushed on our shipbuilding with a vigour which it has not been possible to rival elsewhere. In 1897–98 the total appropriations for shipbuilding were no less than £7,200,000, New construction.

to which a supplementary sum of £500,000 was subsequently added. The laying down programme included four battleships, three third-class cruisers, two sloops, four gunboats, and two torpedo-boat destroyers. In the Estimates now under the consideration of Parliament, the expenditure proposed on shipbuilding amounts to £7,688,697. The laying down programme includes three first-class battleships, besides the Formidable, Implacable, and Irresistible, and eight armoured cruisers. For the French Navy the total expenditure on construction for 1897 was £3,191,849. The Government submitted for the approval of Parliament an additional programme of construction, involving an expenditure of £32,000,000, spread over eight years. In 1898 the charge for new construction has been increased to £4,080,000. In 1897 the vote for new construction, including repairs for the Russian Navy, was £1,574,595. In 1898 it has been increased to £1,977,853. The aggregate expenditure of France and Russia on new construction for 1897–98 was less by about £3,000,000 than the vote for the same service for the British Navy. In the last five years our expenditure on construction has exceeded that of France by some £11,000,000 sterling. The provision seems ample, and it may be confidently assumed that we get the best value for any given outlay.

A recent return of the Board of Trade gives some interesting figures. In 1895–96 the expenditure on the battleships was £21,264,577, as against nearly eleven millions for France and under six millions for Russia. With less than one-tenth of the British commerce to protect, France might well have been content with a Navy less considerable. Russia, which holds the third place among the Naval Powers of Europe, has an insignificant mercantile marine. The expenditure of Germany and Italy may be put in each case at four and a quarter millions.

Manning.

Having given the total expenditure, let us see how we stand in relative resources for the manning of the Navy. The Estimates for 1897–98 provide for 100,050 men as against 44,225 in the French, and 32,477 in the Russian Service. The total Permanent Force for the manning of the Navy as provided in the Estimates now before Parliament aggregates 106,390. Behind the Permanent Force we have a Reserve of 27,000 men and 10,000 pensioners. It is estimated that France could in two days bring in 33,000 men from their Reserve. The total strength on the rolls is 120,000 men, all of whom have served three years in the Navy. The French Reservists are not called out after their period of service afloat has been completed. Men not regularly drilled must gradually lose their efficiency in a period of rapid change in ships and armaments. The French lists

include men who have not been to sea for twenty or thirty years.

It has been asserted by outside critics, and notably by Sir Charles Dilke, that we are not increasing the men in proportion to the ships. That charge was met by Mr. Goschen in an exhaustive speech delivered on the 5th of March, 1897. "The test," he said, "as to the sufficiency of the seamen is this—can we man our ships as fast as they are ready?" On this point he gave a confident assurance to the House of Commons. The Admiralty were well prepared for manning every ship which would be sent to sea on the outbreak of a war. They did not aim at maintaining a Permanent Force sufficient to man every ship in the Navy. As they had a reserve of men, so the older types formed a reserve of ships, for which crews could be raised as the exigencies of the situation required.

Comparing the numbers of men in the British and foreign Navies it should not be omitted from view that in proportion to tonnage our complements are smaller than theirs. M. Brisson, in his recent work, gives the following examples:—

		Displacement. Tons.	Complement.
British . .	Nile . . .	12,400	550
French . .	Formidable . .	11,972	640
British . .	Centurion . .	10,500	515
French . .	Dévastation . .	10,535	644

Naval Reserve.

Plans for raising an adequate Reserve for the Navy have recently been put forward by many competent authorities, by Lord Charles Beresford, by Commander Honner, late R.N., by Captain Caborne, R.N.R., and others. Putting aside minor points on which differences of view have been expressed, it will be generally agreed that it is imperatively necessary to strengthen the Reserve. Greater numbers and a higher standard of efficiency are needed. Every man in the Reserve should have served in the fleet. The State should co-operate with the ship-owners both by subsidies and by the active supervision of Naval officers. It is essential in the public interest to improve the Merchant Navy as a nursery for seamen. Thus far, that national duty has been neglected by England. If no steps are taken to arrest the downward movement in our Mercantile Marine, we shall be compelled to lean more and more on forces permanently maintained at great cost, and which, if largely in excess of peace requirements, will probably be less efficient than could be desired. By the repeal of the Navigation Laws, by opening the trade on our coasts and with our Colonies to the flag of every nation, we have given greater facilities for commerce and reduced the cost of transport by sea. We are not rearing up in the British Merchant Service such a reserve of

seamen as we should certainly require in time of war. It seems absolutely necessary that a plan should be devised for training lads for the Naval Reserve in the Merchant Navy.

In a paper recently published in the *Nineteenth Century* the importance of a Colonial Naval Reserve was fully insisted upon. Backed by the powerful support of Lord Charles Beresford, we may look with confidence to the enrolment of a Colonial Naval Reserve in the near future.

Relative strength in ships.

Turning from the men to the ships, the standard laid down by the Admiralty has been equality to the fleets of any two foreign Powers. Taking France and Russia as the two strongest Naval Powers after Great Britain, the actual position is summarised in the following statement:—

	BRITAIN.			FRANCE.			RUSSIA.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
BATTLESHIPS—									
1st-Class . . .	29	9	38	14	6	20	6	6	12
2nd-Class . . .	7	..	7	8	1	9	4	1	5
3rd-Class . . .	20	..	20	7	..	7	5	..	5
CRUISERS—									
1st-Class . . .	23	11	34	8	14	22	6	4	10
2nd-Class . . .	47	6	53	13	2	15	3	..	3
3rd-Class . . .	34	10	44	9	3	12	1	..	1

Battleships.

On a general review the position of Great Britain is certainly not unsatisfactory. The power of the Navy essentially depends on its battleships. In this all-important class we have a decided advantage. No foreign Power possesses ships equal in fighting power to our nine Majestics, nor can any type of battleship be said to be more effective than the Canopus class, of which no less than six are building. In the older battleships we have a considerable superiority; in coast defence we are weak. It has not been the policy of the British Admiralty to expend money on ships only available for defensive operations. It is a grave question whether the time has not come when vessels should be laid down of a type corresponding with the Henry IV. lately laid down for the French Navy. Vessels of light draught are necessary for in-shore operations, and to hold the Channel in time of war.

Cruisers.

The requirements of the British Navy in the cruiser class cannot be computed on any fixed basis. We require cruisers in large numbers as look-out ships; they are the eyes of the fleet. Under

the rules laid down by the French Naval authorities a squadron should be constituted as follows:—

3 battleships
1 large cruiser
1 third-class cruiser
1 torpedo gunboat
1 destroyer
2 sea-going torpedo-boats.

In a recent paper by Sir Edmund Fremantle, a larger proportion of cruisers and torpedo boats is put forward as necessary. We must be prepared to give protection to our vast commerce, by convoy in the narrow seas, by patrolling the great trade routes across the ocean, by ships stationed at the great converging points of trade, and by hunting down commerce destroyers wherever they may be. We cannot suffer the communication with our Colonies to be interrupted. In a mortal struggle, not for freedom merely, but perhaps for bare existence, it is vain to expect that respect will be paid to treaties, engagements against privateering, and against capture of private property at sea. It is difficult to say that any preparation would be fully adequate to our needs. This at least is certain, that in the Cruiser Class, whether we look to numbers or fighting efficiency, we have obtained an overwhelming superiority. An answer to the critics who are less satisfied with our position is supplied in a recent article in the *Broad Arrow*. "We were in grave danger of being outbuilt prior to the Naval Defence Act, but since 1889 we have built very rapidly and steadily, and few Naval Authorities will contend at this moment that the British Navy is unfit to cope with those of France and Russia combined. We have at least a slight superiority in battleships, and a large preponderance in cruisers. Whether the superiority is sufficient is of course a debatable subject, and one upon which Sir Charles Dilke is well qualified to give his opinion. If blockade of the enemy's ports is to be regarded as the prime objective of our fleet, then all experts must agree with Sir Charles Dilke that we lack the needful preponderance of battleships; but battleships are costly articles in these days, and we do not believe it likely that Parliament will find money for the provision of battleships in the proportion of five to three owned by the two next powerful Navies. The country should be content, we consider, with a moderate numerical superiority of battleships, and such is distinctly the attitude of the present Government. As regards cruisers, it is extremely difficult to calculate our exact requirements, and nothing

is easier than to assert that we are deficient in this type of ship. The seaborne commerce to be protected is enormous, and war would in any event cause grave disturbance in our trade; but we are none the less very well supplied with cruisers as compared with other Powers, and such a comparison must be made in order to judge the risks involved."

Shipbuilding resources.

In the consideration of our relative position the ability to reinforce the fleet when a struggle threatens should not be lost from view. Our superiority in this regard would assuredly become more and more conspicuous in the progress of a great struggle. Our industrial resources are unrivalled, and, if concentrated on the reinforcement of the fleet, the balance of power at sea would incline more and more in our favour. The work done in 1896 affords striking evidence of the capability of our shipbuilding yards. No less than fifty-nine ships were launched in the United Kingdom for British and Foreign Governments. Their aggregate displacement was 155,845 tons. The propelling machinery was of 377,980 I.H.P., and the value when completed £10,750,000. Of these ships nine were launched from the Royal yards and fifty by private firms. Of the latter twenty-four were for foreign Governments, including Japan, Brazil, Chili, Spain, and the Argentine Republic.

Ships in commission.

If we turn from the comparisons already given of the total available force in men and ships to the fleets in commission, it will be seen from the lists given in Chapter III. that the British Navy is well able to hold its own. The Admiralty are steadily pursuing the wise policy of forming our most powerful squadrons of ships identical in type. The battleships of the Mediterranean fleet are of the Royal Sovereign type of 14,000 tons. The battleships of the Channel fleet are of the somewhat larger and later Majestic type. In case of war both these squadrons would require additional cruisers and look-out ships. It is, as Mr. Goschen told the House of Commons in a recent debate, one of the points which particularly impresses foreign critics that we are able, as no other Power is able, to put into line a number of ships of precisely the same speed, coal endurance, and design. A thoroughly homogeneous squadron is much more easily and effectively handled. It is a great advantage to all classes of seamen to be thoroughly familiar with the ships in which they serve, and for each man to know the duties of his post as soon as he steps on board.

Spithead Review.

In this connection reference may appropriately be made to the recent review of the fleet at Spithead. It was not the least impressive of the incidents connected with the recent celebration of the Diamond Jubilee. No less than 165 vessels were brought

together, manned by more than 50,000 men. There were still available 2000 ratings in the Portsmouth Reserve alone; the Marines and the Coastguard had only been partially drawn upon, the Reserve had been barely touched. The displacement of the ships mustered at Spithead * aggregated over half a million of tons. The number of guns was over 2000, including more than 500 heavy quick-firers. The speed of the battleships averaged about 17½ knots, while that of the cruisers was about 19½ knots. With some twelve exceptions, all the vessels had been designed, laid down, launched, and completed in a period of eight years. It was, as the *Army and Navy Gazette* observed, a truly magnificent record of the work recently accomplished in the reinforcement of the Fleet.

The impression made on foreign observers may be gathered from the remarks of M. Maurice Loir, as reproduced from the French press in the *Army and Navy Gazette*:— M. Loir's impressions.

"Though a Naval Review is the official title given by the Jubilee Programme to the imposing concentration of British men-of-war in Spithead Roads, that title is hardly accurate. What is contemplated is far less a review than a great Naval manifestation, or, to put it in plain words, the solemn affirmation of the sea power of England. Of course, I knew beforehand that, in thus assembling 165 men-of-war in front of the greatest Naval harbour and arsenal in the world, England meant to give the world the measure of her strength, but I freely confess that I was not prepared for such a deep, such a penetrating sensation as that which I experienced when, on arriving in the steamer from Havre, I passed in front of that Fleet, extending over a length of ten kilometres (five miles and two furlongs), and massed in four dense lines. I would draw from its assemblage the lesson that it conveys. First, be it noted, that in order to bring together this formidable Armada, England has not drafted a single unit from her Mediterranean Squadron, or her divisions in the Atlantic, Pacific, or the Far East. The ships which she arrays before us at Spithead all come out of home stations and harbours; and we cannot forget that, besides this powerful home force, 140 men-of-war are flying the St. George's ensign all over the world, even in its remotest regions No wonder the English are proud in the consciousness of their strength. They manifest their joy somewhat noisily, perhaps, but I for one do not blame them. I admire them, and, to tell the truth, my admiration is not untinged with envy, for if they have attained the degree of power which they unquestionably possess, it is to themselves, to their energy, to their tenacity, to their indomitable will, that they owe it. Their supremacy at sea has long since been

* For list *cf.* Chapter I.

established on the ruin of nations who once had a sea power that balanced theirs. But never has their sea power been greater than at the present moment."

Reflections suggested.

That great muster at Spithead is suggestive of many grave reflections. While careful to maintain the strength of the Navy adequately in every arm, the prudent administrator will not carry expenditure beyond what is necessary in the circumstances of the time. Who shall with confidence anticipate the developments of the future? That inner line of destroyers at Spithead had an ominous look. How would it fare with the first-class battleship if assailed at the same moment and with dauntless courage by ten or by twenty destroyers? Is it certain that in an attack by day not one of the puny assailants would strike home? And what would be the probable issue under the cover of fog or darkness? These are considerations which cannot be put out of view in framing a programme of construction. They are indeed a fatal objection to any programme extending far into the future.

II. Shipbuilding.

Battleships.

The four great requirements in a battleship are, without doubt, speed, radius of action, gun power, and defensive armour. The weather gauge of to-day is the power to outsteam the fleet of the enemy, the power to concentrate quickly, and bring on a general action at the most favourable moment. While it has been necessary to sacrifice about 25 per cent. of the weight appropriated in our largest ships to defensive armour, the Canopus class have a decided superiority in speed, and speed is an all-important factor in fighting efficiency. It enables the gunner to choose his range, far more than helm power it endues a ship with handiness, and enables her to parry or avoid the blow of the ram. Speed is also a most important strategical factor.*

After a careful examination of the types of battleships recently constructed for our own and foreign Navies, we are brought to the conclusion that in so far as the relative strength of the British Navy depends upon skill in shipbuilding and efficiency of armament, we have nothing to fear from a comparison with foreign nations. The evolution of the modern ironclad fairly establishes the impossibility of producing a perfect type. Every increase of protection in one direction involves diminution of protection elsewhere. In the French ships protected by a continuous belt it is always seen that increase in thickness of armour at the centre involves reduction at the extremities.

* The new battleships are to have a speed of 18 knots with natural draught.

If we turn to French writers, the ideal type of battleship recommended by M. Lockroy would be of 10,000 to 12,000 tons, with a coal endurance at 14 knots of 3000 knots, and at 10 knots of 8000 knots. He conceives that such vessels might be secured from torpedo attack by their speed, and sufficiently armoured to withstand the attacks of the most formidable battleships. In his view it should be the aim of a great maritime power to fight battles at sea, while less formidable powers should avoid such conflicts, and as far as possible direct their efforts to the interruption of commerce, the bombardment of an enemy's boats and harassing his coasts. Speed has become a necessary feature even in battleships. It has been long advocated by writers, of whom Vice-Admiral Jurien de la Graviere was one of the most able, that the efforts of France should be directed to the creation of squadrons of great speed, which by their rapidity of movement would be secured from capture, and would be able to inflict injuries upon an enemy unprotected by fleets of heavy armoured ships. French opinions.

Every ship of war is a compromise between numerous and conflicting considerations. With every addition to displacement some advantage is secured, whether in armour, armament, speed, coal endurance, or sea-keeping qualities. Yet there are obvious objections to increasing dimensions. A single blow from the ram may be fatal to the most powerful ship. Armour offers no protection to the torpedo, and that formidable weapon has a speed of over 30 knots at a range of 600 yards. At night or in thick weather guns would have little effect. Even under the most favourable conditions, Commander Sturdee, the author of a recent prize essay, is of opinion that it would be difficult and perhaps impossible to sink each one of a large number of torpedo boats advancing at high speed. Moderate dimensions.

If the policy of building certain ships of reduced dimensions were approved, the Monitor is the type which would probably exhibit the highest fighting efficiency. In Mediterranean waters, more especially, the objection to a low freeboard is less serious than in the case of ships required to keep the ocean for an extended period. The low freeboard, which was carried to extremes in the Monitor, may be compensated, as in the French Tréhouart and Bouvines, by adding a superstructure forward.

To the present writer it appears a wise policy to rest content with the admirable combination of the several elements of fighting efficiency which have been secured in the Canopus type, the latest design which has issued from the skilful hand of Sir William White. So, too, in the cruiser class, except for the purpose of meeting some quite exceptional ship under a foreign flag, it does not seem justifiable

to go beyond the ample range of 11,000 tons which has been reached in the numerous and powerful group of first-class cruisers recently laid down.

British Naval constructors.

Having shown the relative strength of the British and Foreign Navies in ships,* it is an agreeable duty to pay their due meed of praise to the Chief Constructor of the Navy (Sir William White), to his able staff, and to the private shipbuilders of Great Britain. With admirable skill, and inexhaustible fertility of resource, they have responded to the call recently made on their administrative and professional ability. The latest reports of the United States Officers quote some remarkable examples. Our first-class battleships of 14,900 tons are completed for sea within two years. Two of this class—the Magnificent and the Majestic—beat the record, the former having been completed in one year four months and twenty days, and the latter in one year and ten months from the date of laying down the keel. The monster cruisers Powerful and Terrible were completed six months within their contract dates. As another example of rapid construction, it may be mentioned that a cruiser of the Diadem class, of 11,000 tons, was launched from the famous Fairfield Yard on the Clyde in 214 working days from the date of laying down. In France the British rate of building has not yet been approached. The United States Officers report that the delay in completing ships and the slow rate of construction have given occasion for much complaint. The time necessary to build various types of large vessels is approximately for battleships five years, and for cruisers from three to four years.

Designing of French ships.

In the French service the designs for ships are the work of many minds. A Council of Construction, consisting of no less than sixteen officers, representing the Naval and professional elements, traces in its broad features the design of the ship which it is proposed to build. The tonnage, principal dimensions, armament, and horse-power having been determined, detailed designs are invited from the five dockyards. The invitation always meets with a ready response. When completed, the designs are sent for approval to Paris, where they are subjected to minute criticism. Alterations and modifications are introduced by so many hands that all individual responsibility is lost. Monsieur Lockroy condemns the French system as faulty and unsatisfactory in its results. He strongly advocates that the designs for ships should be prepared as in England under the undivided responsibility of one superior officer. Monsieur Lockroy desired to give to Monsieur Bertin a position of personal responsibility similar to that held by Sir William White. Under the system followed

* Certain descriptions of ships already described have been omitted.—Ed.

at the British Admiralty, a Council of Construction is not required.

It is stated by the same authority that the metallurgical industry in France is a close syndicate, which compels the Government to pay exorbitant prices. The cost of shipbuilding in France is higher than in any other country in Europe—higher than in Italy or Germany. In England with an equal sum of money three ships can be built as against two in France. The difference is mainly due to the greater cost of the raw material. The wages of the workmen in the English dockyards average one third more than in France.

Among the new ships of the cruiser class, the Powerful and Terrible demand especial notice. The displacement is 14,200 tons. These unprecedented dimensions for the cruiser class have not been universally approved. Ships of so great a size and cost, and which yet are not available for the line of battle, cannot be multiplied, even in the British Service. Mr. Wilson is of opinion that two ships of 11,000 tons would have been a more effective answer to such a cruiser as the Russian Rurik than any single ship, however powerful. He urges that all first-class cruisers should be protected with 4-in. armour, which would explode dangerous shells from quick-firers outside the ship, and could be carried on a ship not exceeding the displacement of our Edgar class of 7,500 tons. Mr. Wilson criticises our cruisers for insufficiency of speed, due to exaggeration of beam. He would lengthen our Edgar class to 395 ft., and reduce the beam to 56 ft. This alteration would increase the speed by one knot. **Cruisers. Powerful.**

In pursuance of the policy of building cruisers of dimensions never before approached, eight first-class cruisers of the Diadem class are being constructed. The large dimensions (11,000 tons) adopted have been devoted to the attainment of a higher continuous sea-speed, a more perfect system of protection to the guns and ammunition supply, and to the sheathing and coppering of the ships' bottoms in order that they may be able to keep the sea for a longer period without docking. The considerable offensive power which these vessels possess would enable them to cope with anything afloat, save a modern battleship, and their great speed would enable them to avoid a conflict with an enemy superior to themselves. They should prove equal to making quick passages in heavy weather, and altogether they promise to be useful adjuncts to a fleet of heavy ships. The Jeanne d'Arc, now building for the French Navy, has greater length, less beam, more draught of water, more power and speed. The protection and armament are differently distributed. As to which is best for fighting efficiency, it is not **Diadem class.**

easy to decide. In coal supply the British ship should have the advantage.

Cressy class.

Four cruisers of a new type are now in hand. The displacement is 12,000 tons; the armour will be capable of resisting the penetration of a 6-in. gun; the speed will be 21 knots, and the cost of each ship £700,000. The new cruisers compare in fighting efficiency with battleships such as the Centurion. In France the construction of cruisers of the most powerful type is strongly urged. The dimensions proposed are from 8000 to 9500 tons, and the speed 21 knots.

The advance in dimensions in the cruiser class is conspicuously seen in the Talbot, Arrogant, and Hermes types, of which we have eighteen, built and building. Their displacement of 5600 to 5800 tons is about the same as that of the belted cruisers, which were originally classed as armoured ships. The speed of the Talbot type is 19 knots, and the total coal capacity is 1000 tons.

The latest type of our third-class cruiser is represented by the eleven vessels of the Pelorus type. The displacement is 2135 tons; speed, 20 knots. Their radius of action at 10 knots speed is calculated at 6000 miles, which may be considered entirely satisfactory for cruisers of their size, being twice that of the Bellona. They have also a higher freeboard, and so will be better sea-keeping vessels than the Bellona, and will carry a more powerful armament.

Turning to the torpedo-boat destroyers, we possess a total of ninety vessels of this class. The speeds have gradually increased from 26 knots in the earliest, to 33 knots in the latest types. The coal capacity is ninety tons, giving an endurance of 3,500 knots at 13 knots.

III. Works.

While largely adding to the men and ships, we are making great efforts to improve and fortify our dockyards and strong places at home and abroad. The expenditure for these services in 1897–98 will be no less than £2,600,000. Two new graving docks have recently been completed at Portsmouth; three are in hand at Gibraltar; Devonport has been equipped for building as well as fitting out the largest ships. At Gibraltar, Portland, and Dover extensive moles are being constructed, enclosing anchorages of sufficient extent to enable large fleets to lie secure from torpedo-boat attack. In addition, a sum of £1,120,000 is taken in the Army Estimates for defensive works at Portsmouth, Plymouth, and Cork. Falmouth, Lough Swilly, Berehaven, and the Scilly Islands are to be fortified, and the defences of Gibraltar, Capetown, Hong Kong, and Singapore are to be completed.

IV. Colonial Defence.

At the great muster of representatives of the Empire on the occasion of the Diamond Jubilee, the question of Colonial Defence was fully discussed at the conferences between the Colonial Premiers and Mr. Chamberlain. The part which the Royal Navy was prepared to undertake was clearly stated by Mr. Goschen. The Admiralty would rely upon the localities themselves for the defence of the ports, while they would undertake that no organised squadron should be directed against any part of Australia. The British Fleet is too ubiquitous for any such expedition to be secretly organised. If it were organised, the whole strength would be directed to defeating such a movement. Unless Britain actually lost her sea power it would be her duty to defend Australia, for the safety of which she held herself responsible in the same way as the Navy was responsible for the safety of the British Islands.

V. Comparative Strength Generally.

The opinions of foreign observers may perhaps carry more weight than those expressed by British Officers. The views of leading authorities in France, including writers in the Press, ex-Ministers of Marine, and Naval Officers, have lately been published in the London *Morning Post*. The strength of our position appeared to these foreign critics indisputable. In Egypt and Gibraltar we occupied the two gates of the Mediterranean. In all the various types of ships of which a fleet is composed, from the battleship to the torpedo boat, our vessels were equal to any types which can be seen under foreign flags. The general opinion was summed up by M. Greville Reache, one of the authorities quoted:—"I always look with profound astonishment on the statesmen of your country, who, in order to get the Navy increased, pretend that it is less considerable, or threatens to become less considerable, than that of such-and-such a European power. The Naval Forces of England are so great that they can face, not a combination of any two European Navies, but perhaps of any three. Such is my sincere impression of the Naval Power of Great Britain." Foreign opinion.

The London *Daily Chronicle* has recently published an important opinion with reference to the manning of the British Navy from the pen of Captain Mahan. That able writer is of opinion that "the longer service of British seamen is a great advantage to our Navy. In France the seaman is discharged just as his raw period has passed. Captain Mahan.

Not so in England, where the service having been at the trouble and expense of training him, retains for a lengthened period the services of the perfectly-drilled man. The British Navy has another advantage in the comparatively early promotion of its officers. In France the average age of becoming Captain in the Navy is fifty years. With us unless an officer obtains promotion to the rank of Captain before he is forty, he never becomes an Admiral." "Yet another advantage the British Navy possesses as against a combination of any two Powers. One whole is better than two parts, and sometimes very much better. One nation with one training, one cause, one purpose, and a common language, should certainly be superior to any combination. History is not favourable to coalitions."

Situation of ports.

In this connection it may appropriately be observed that Germany and Great Britain have a decided advantage in the situation of their Naval and commercial ports at the head of estuaries difficult of access and easily defended. Bremen, Hamburg, Kiel, and Liverpool are secure from attack. It is not so in France, where, with the exception of Nantes, Rouen, and Bordeaux, which are quite safe from a sudden assault, all the commercial ports are on the open coast, open to attack and imperfectly defended. There is practically no means of defending Calais, Boulogne, Havre, St. Nazaire, Cette, Marseilles, and Nice. The railway between Toulon and Marseilles follows closely the shore line, and could easily be interrupted by hostile fleets.

Military resources.

While it has been the special object of the present Paper to review the Naval strength of the British Empire, in a general comparison we should not fail to take note that as a Military Power we have many legions at our disposal. The approximate strength of the British Armies exceeds 900,000 men. In the Regular Army we have 220,000 men, in the Army Reserve 80,000, in the Militia—which with little additional expenditure could be made a most efficient force—108,000, in the Yeomanry and Volunteers 232,000 men. The Australian and Canadian Contingents have each a strength of 30,000. All these are of our own race. In addition we have the native forces in India and other parts of the Empire. We have recently, for the first time in peace, effectively organised the Transport and Supply Services. We alone of all nations could place our armies at short notice in any part of the globe. This power of transport may be set in the scale against the superior numbers of foreign Powers.

Material position.

It has been said that money is the sinews of war. In moving the Budget for 1897–98, our financial position was described in glowing terms by Sir Michael Hicks-Beach. He showed that in the sixty years of the present reign the public revenue of the United Kingdom had increased from £52,000,000 to £112,000,000 a year; the imports

from £67,000,000 to £442,000,000; the deposits in the Savings Bank from £19,000,000 to £155,000,000. In no quarter of the House of Commons was a speaker found to contest the soundness of the British position, or to express a doubt as to the general prosperity and steady improvement in the condition of the people. While regretting the necessity for the rapid growth of expenditure on warlike preparations, it is difficult to find any indications that the mother country is sinking under her burdens. Never has the public revenue been more elastic, never has the traffic on the great railways of the United Kingdom been so active, never have the numbers of the unemployed in the skilled trades been so few as to-day. The increased appropriations for the Navy have been provided in great part by a succession duty. That impost has fallen heavily on landowners. It has compelled reductions of expenditure which have been chiefly felt in rural places, where fine old mansions have been closed, and troops of retainers have been dispersed. The money raised has gone at once into circulation elsewhere in payments for materials and for the wages of the workers employed in shipbuilding. It is not clear that the country at large has suffered by this redistribution of money. It is by no means certain that trade would have been more prosperous if the vast sums lately spent on the Navy had been invested in reproductive enterprises. Certain it is that the increase of production would have reduced prices, and that manufacturing enterprise is, and has long been, far from remunerative. All will agree that we have not suffered the exhaustion which would have been caused if a like amount had been spent on the purchase of ships built for the British Navy in foreign yards.

Colonial feeling.

The recent celebration of the Diamond Jubilee has brought prominently into view a source of strength greater than any force which can be created by the most lavish preparations for war. It is derived from the mutual affection and respect of the mother country and her daughter States. We need not look for alliance to foreign Powers. It was well said by a leader writer in the *Australasian*, "Our allies are of Nature's own making." They are our sons in these noble Colonies, whose strength and resources are steadily growing, and whose love for the Old Country preserves, and will preserve, her for all time from the weakness of isolation.

Power of a league of English-speaking peoples.

The work of building up the Naval Power of the British Empire has been undertaken and carried forward with equal zeal by Liberal and Conservative Administrations. To use the words of Lord Dufferin, in bidding farewell to the British Embassy in Paris, it has become a national conviction deeply rooted that, in spite of Christianity and civilisation, no nation's independence or possessions are safe for a

moment unless she can guard them with her own right hand. Under this conviction we have greatly strengthened the Navy. Meanwhile, let us spare no effort to establish good relations with all foreign Powers. General Grant, the Soldier-President of the United States, was a strong supporter of the Universal Peace Union. Writing in 1879, he said that though he had been in many battles, yet there was never a time when he lost his desire that some just and fair way should be devised for settling difficulties instead of bringing innocent persons into conflict. That just and fair way of adjusting difficulties between all nations, and especially friendly and kindred nations, which General Grant desired to see, has lately been proposed by the Government of Lord Salisbury and favourably entertained by President McKinley. It has been, and it is, our duty to create such Naval forces as will ensure the safety of the Empire and secure due respect for our rights and consideration for our views and opinions. In the present anxious posture of affairs we shall not relax our efforts, but if in the process of time we can bring about a closer union between ourselves and the United States, if we can establish a perpetual league of all English-speaking peoples for settling differences by arbitration—nay, more, for mutual defence if threatened by external foes—then we shall have changed the circumstances. Our latent resources will be too overwhelming to be challenged or contested, and the day may at length have come when the vast sums which we are now expending on preparations for war may be devoted to the arts of peace. Let us cherish the hope that a consummation so happy may some day be reached by the sagacity of statesmen and the growing wisdom and goodwill of kindred peoples.

BRASSEY.

PART II.

BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

PART II.

ALPHABETICAL LIST OF BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

The lists of ships were subjected to important modifications (ed. 1896). The order of the columns was rearranged so as to correspond in the British and Foreign Lists. A column was introduced for complements in place of that for coal endurance, and the place in the foreign lists where a ship is built was added. The calibre of all foreign guns is now given in inches.

The maximum draught at normal displacement has been given wherever it was possible to ascertain it.

As every nation is constantly rearranging the armament of individual ships, it is only possible to publish the latest accessible information.

The vessels which in the British Official *Navy Lists* are called First-Class Gunboats, and in the French Lists are known as Aviso Torpilleurs, are called in these lists Torpedo Gunboats. Torpedo-boats of all classes below Torpedo Gunboats are placed in a separate list.

Storeships, Harbour Service Ships, and Training Ships are not included in these lists.

The ships of those Powers whose Navies are of small importance will be found at the end of Part II.

The sketches of many ships have been reduced to half scale, so as to enable more sketches to be given without increasing the size of the book.

ABBREVIATIONS.

The following abbreviations are used throughout the Alphabetical List, occurring mainly in the first column, showing the class of ship, and in the armour column:—

a.c.	Armoured cruiser.	g.b.	Gunboat.
a.g.b.	Armoured gunboat.	g.v.	Gun-vessel
b.	Barbette ship.	H.S.	Harveyed steel.
br.	Broadside ship.	K.S.	Krupp steel.
c.b.	Central-battery ship.	I.	Iron hull.
c.d.s.	Coast-defence ship.	S.	Steel hull.
c.	Composite-built hull.	2 s.	Twin screw.
comp. (in armour column).	Compound or steel-faced armour.	t.	Turret-ship.
		t.	Trial-speed (in speed column).
c.t.	Conning-tower.	to.cr.	Torpedo-cruiser.
shd.	Sheathed.	to.g.b.	Torpedo-gunboat.
corv.	Corvette.	to.r.	Torpedo-ram.
cr.	Cruiser.	w.	Wooden hull.
d.v.	Despatch vessel.		

Armament abbreviations. As breech-loading rifled guns are now the most numerous in all fleets, it must be understood that all guns are of that description, unless it be otherwise indicated.

l.	Light guns under 15 cwt., including boats' guns.
M.L.R.	Muzzle-loading rifled guns.
Q.F.	Quick or rapid-firing guns.
f. tu. or b. tu.	Fixed or bow tube for discharging Fish Torpedoes.
sub.	Submerged tube for do.

GREAT BRITAIN.—Armoured Ships.

Class	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
a.c.	Aboukir	S.	12,000	440 0	69 6	26 3	2	21,000	Glasgow	..	..	..	6 K.S.	5 K.S.	6 K.S.	3–2	2 9·2-in. B.L., 12 6-in. Q.F., 17 smaller Q.F.	2	21·0	800	615
a.c.	Achilles	I.	9820	380 0	58 3½	27 3	1	4000	Chatham	Penn	1864	444,546	4½	4½	4½	18–10	14 9-in. M.L.R., 2 6-pr., 8 3-pr. Q.F., 16 M., 2 l.	..	12·7	750	707
t. 2nd c.	Agamemnon	I.	8660	280 0	66 0	24 0	2	4500	Chatham	Penn	1883	504,065									
t. 2nd c.	Ajax	I.	8660	280 0	66 0	24 0	2	4500	Pembroke	Penn	1883	518,357	18–15	16	16	18–9 3	4 12·5-in M.L.R., 2 6-in., 6 6-pr. Q.F., 8 3-pr., 5 M., 2 l.	2	12·1	960	410
a.c.	Agincourt	I.	10,600	400 0	59 5	27 9	1	4000	Birkenh'd	Maudslay	1868	465,477	5½	4½	5½	10	17 9-in., M.L.R., 2 20-pr., 10 3-pr. Q.F., 7 M., 5 l.	2	12·0	750	687
b. 1st cl	Albion	S.	12,950	390 0	74 0	25 5	2	13,500	Blackwall	Maudslay	Bldg.	802,910	8 H.S.	6 H.S.	12–5 H.S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·75	1850	700
c.b. 2nd c.	Alexandra	I.	9490	325 0	63 8	26 6	2	7000	Chatham	Humphrys	1877	514,324	12	8–5	8	12–10 1½–1	8 10-in. M.L.R., 4 9·2-in., 6 4-in., 4 6-pr. Q.F., 6 3-pr., 13 M., 3 l.	4	14·3	680	600
b. 1st cl	Anson	S.	10,600	330 0	68 6	27 3	2	11,500	Pembroke	Humphrys	1889	x 724,765	18 comp.	16 comp.	14–12 comp.	10–15 3–2½	4 13·5-in., 6 6-in., 12 6-pr. Q.F., 10 3-pr., 7 M., 2 l.	5	16·9	1200	515
c.b. 3rd c.	Audacious	I.	6010	280 0	54 0	23 8	2	3300	Glasgow	Ravenhill	1869	246,482	8	5	6	10	10 9-in. M.L.R., 8 4-in., 4 6-pr. Q.F., 6 3-pr., 6 M., 3 l.	4	11·6	500	492
a.c.	Aurora	S.	5600	300 0	56 0	24 6	2	8500	Pembroke	Thomson	1889	x 284,550	10 comp.	16 comp.	4½	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3 pr., 6 M., 3 l.	2	18·0	900	484
a.c.	Australia	S.	5600	300 0	56 0	24 6	2	8500	Glasgow	Napier	1888	259,390						4			
b. 1st cl.	Barfleur	S. shd.	10,500	360 0	70 0	25 6	2	13,163	Chatham	Greenock Foundry	1894	599,089	12 comp.	12 comp.	9	.. 2½–2	4 10-in., 10 4·7-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 2 l.	7 (2 sub.)	18·5	1240	606
c.d.s. c.b.	Belleisle	I.	4870	245 0	52 0	21 0	2	2600	Poplar	Maudslay	1878	240,000 (purchas'd)	12	9	9	16–9 3–1	4 12-in. M.L.R., 6 6-pr. Q.F., 6 M., 2 l.	2	11·9	510	284

Class	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
c.b. 3rd c.	Bellerophon	I.	7550	300 0	56 1	6 7	1	4000	Chatham	Penn	1866	322,701	6	5	6	10	10 8-in., 4 6-in., 6 4-in., 4 6-pr. Q.F., 12 M., 4 l.	2	12·4	650	572
b. 1st cl.	Benbow	S.	10,600	330 0	68 6	27 3	2	11,500	Blackwall	Maudslay	1888	760,820	18 comp.	16 comp.	14–2 comp.	12–15 3–2½	2 16·25-in., 10 6-in. Q.F., 10 3-pr., 7 M., 2 l.	5	16·75	1200	509
b. 1st cl.	Cæsar	S.	14,900	390 0	75 0	27 6	2	12,000	Portsm'th	Maudslay	1897	865,533	9 H.S.	14–9 H.S.	14–6 H.S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3 pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
b. 1st cl.	Camperdown	S.	10,600	330 0	68 6	27 3	2	11,500	Portsm'th	Maudslay	1889	x 769,456	18 comp.	16 comp.	12 comp.	10–15 3–2½	4 13·5-in., 6 6-in., 12 6-pr. Q.F., 10 3-pr., 7 M., 2 l.	4	16·9	1200	515
b. 1st cl.	Canopus	S.	12,950	390 0	74 0	25 5	2	13,500	Portsm'th	Greenock Foundry	Bldg.	835,257	6 H.S.	12 H.S.	12–5 H.S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·75	1850	700
b. 1st cl.	Centurion	S. shd.	10,500	360 0	70 0	25 6	2	13,214	Portsm'th	Greenock Foundry	1893	608,098	12 comp.	12 comp.	9 comp.	.. 2½–2	4 10-in., 10 4·7-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 2 l.	7 (2 sub.)	18·51	1240	622
b. 1st cl.	Collingwood	S.	9500	325 0	68 0	26 10	2	9500	Pembroke	Humphrys	1886	624,000	18 comp.	16 comp.	12 comp.	17–10 2½	4 12-in., 6 6-in. Q.F., 12 6-pr. 8 3-pr., 6 M., 2 l.	4	16·50	1200	480
t. 2nd c.	Colossus	S.	9420	325 0	68 0	26 3	2	5500	Portsm'th	Maudslay	1886	646,786	18–14 comp.	16–13 comp.	16 comp.	22–10 3–2½	4 12-in., 5 6-in., 4 6-pr. Q.F., 10 3-pr., 6 M., 4 l.	2	14·2	970	388
t. 3rd c.	Conqueror	S.	6200	270 0	58 0	24 0	2	6000	Chatham	Humphrys	1882	418,433	12–8½	11½	12	13 2½–1¾	2 12-in., 4 6-in., 6 6-pr. Q.F., 12 M., 2 l.	6	15·3	650	330
a.c.	Cressy	S.	12,000	444 0	69 6	26 3	2	21,000	Glasgow	..	..	..	6 K.S.	5 K.S.	6 K.S.	3–2	2 9·2-in. B.L., 12 6-in. Q.F., 17 smaller Q.F.	2	21·0	800	615
c.d.s. t.	Cyclops	I.	3560	225 0	45 0	16 4	2	1200	Blackwall	Elder	1871	154,026	8–6	9–8	9	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 5 M., 1 l.	..	9·9	250	196
t. 2nd c.	Devastation	I.	9330	285 0	62 3	27 6	2	7000	Portsm'th	Maudslay	1873	353,848	12–10	12–10	14	18–16 3–2	4 10-in., 6 6-pr. Q.F., 8 3-pr., 5 M., 2 l.	2 (2 sub.)	14·0	1800	410
t. 2nd c.	Dreadnought	I.	10,820	320 0	63 10	26 9	2	6500	Pembroke	Humphrys	1875	592,573	14	13	14	18–15 3–2	4 12·5-in. M.L.R., 6 6-pr. Q.F., 12 3-pr., 7 M., 2 l.	2	13·7	1200	453
t. 2nd c.	Edinburgh	S.	9420	325 0	68 0	26 3	2	5500	Pembroke	Humphrys	1886	642,333	18–14 comp.	16–13 comp.	16 comp.	22–10 3–2½	4 12-in., 5 6-in., 4 6-pr. Q.F., 10 3-pr., 6 M., 2 l.	2	14·2	970	388
b. 1st cl	Empress of India	S.	14,150	380 0	75 0	27 6	2	13,000	Pembroke	Humphrys	1893	838,087	18–5 comp.	16 comp.	17–6 comp.	.. 3	4 13·5-in., 10 6-in. Q.F., 16 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	1800	740

x Includes Hydraulic Machinery, Gun Mountings, &c.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
b. 1st cl	Formidable	S.	15,000	400 0	75 0	26 9	2	15,000	Portsm'th	..	Bldg.	..	..	..	..	..	4 12-in. B.L., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M.	..	18·0	900	750
a.c.	Galatea	S.	5600	300 0	56 0	24 6	2	8500	Glasgow	Napier	1889	258,390	10 comp.	16 comp.	4½	6 3–2	2 9·2-in., 10 6-in., Q.F., 6 6-pr. 10 3-pr., 6 M., 3 l.	4	18·1	900	484
c.d.s. t.	Glatton	I.	4910	245 0	54 0	19 5	2	2000	Chatham	Laird	1872	219,529	12–10	12	14	20 3–1½	2 11-in. M.L.R., 3 6-pr. Q.F., 4 M., 1 l.		11·0	540	192
b. 1st cl	Glory	S.	12,950	390 0	74 0	25 5	2	13,500	Laird	Laird	Bldg.	844,057	6 H. S.	12 H. S.	12–5 H. S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·75	1850	700
b. 1st cl.	Goliath	S.	12,950	390 0	74 0	25 5	2	13,500	Chatham	Penn	1898	812,968									
c.d.s. t.	Gorgon	I.	3560	225 0	45 0	16 4	2	1200	Jarrow	Ravenhill	1872	138,567	8–6	9–8	10	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 5 M., 2 l.	..	9·9	270	192
b. 1st cl	Hannibal	S.	14,900	390 0	75 0	27 6	2	12,000	Pembroke	Harland	1897	867,403	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
c.d.s. t.	Hecate	I.	3560	225 0	45 0	16 4	2	1200	Poplar	Ravenhill	1872	140,593	8–6	9–8	10	11 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 4 M., 1 l.	..	9·9	270	205
c.b. 3rd c	Hercules	I.	8680	325 0	59 0½	26 6	1	8500	Chatham	Penn	1868	361,134	9–6	6–5	9	12–10	8 10-in. M.L.R., 2 9-in. do., 4 7-in. do., 6 4·7-in. Q.F., 9 6-pr., 13 3-pr., 7 M., 2 l.	4	14·6	610	638
t. 3rd c	Hero	S.	6200	270 0	58 0	24 0	2	6000	Chatham	Rennie	1888	397,271	12 comp.	11½ comp.	12 comp.	13½ 2½–1¾	2 12-in., 4 6-in., 7 6-pr. Q.F., 5 3-pr., 6 M., 2 l.	6	15·2	620	330
a.c.	Hogue	S.	12,000	440 0	69 6	26 3	2	21,000	Glasgow	..	..	..	6 K.S.	5 K.S.	6 K.S.	3–2	2 9·2-in. B.L., 12 6-in. Q.F., 17 smaller Q.F.	2	21·0	800	615
t. 1st cl.	Hood	S.	14,150	380 0	75 0	27 6	2	13,000	Chatham	Humphrys	1893	830,536	18 comp.	17 comp.	18–6 comp.	.. 3	4 13·5-in., 10 6-in. Q.F., 10 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	1800	730
c.d.s. t.	Hotspur	I.	4010	235 0	50 0	21 10	2	2500	Glasgow	Napier	1871	171,528	11 & 8	8	10–8½	15–10 2–1	2 12-in. M.L.R., 2 6-in., 8 12-pr., 4 3-pr. Q.F., 8 M., 2 l.	..	11·25	300	232
b. 1st cl.	Howe	S.	10,300	325 0	68 0	27 3	2	11,500	Pembroke	Humphrys	1889	667,022	18 comp.	16 comp.	11½ comp.	15–12 3–2½	4 13·5-in., 6 6-in. 5-ton, 12 6-pr. Q.F., 10 3-pr., 7 M., 2 l.	1	16·8	1200	515
c.d.s. t.	Hydra	I.	3560	225 0	45 0	16 4	2	1200	Glasgow	Elder	1872	141,372	8–6	9–8	9–10	11–9 1½	4 10-in. M.L.R., 4 3-pr. Q.F., 5 M., 2 l.	..	9·9	250	196
b. 1st cl.	Illustrious	S.	14,900	390 0	75 0	27 6	2	12,000	Chatham	Penn	1898	885,945	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
a.c.	Immortalité	S.	5600	300 0	56 0	22 6	2	8500	Chatham	Earle	1889	278,500	10 comp.	16 comp.	4½	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 6 M., 3 l.	2	18·0	900	484
a.c.	Impérieuse	S. shd.	8400	315 0	62 0	27 4	2	10,000	Portsm'th	Maudslay	1886	x 530,814	10 comp.	9 comp.	4½ comp.	10 4–2	4 9·2-in., 10 6-in. Q.F., 8 6-pr., 10 3-pr., 6 M., 2 l.	6	16·7	1130	544
t. 2nd c	Inflexible	I.	11,880	320 0	75 0	26 4	2	6500	Portsm'th	Elder	1881	795,268	24–16	22–14	17 comp.	17–25 3	4 16-in. M.L.R., 8 4-in., 4 6-pr. Q.F., 2 3-pr., 15 M., 2 l.	4 (2 sub.)	12·8	1300	485
c.b. 3rd c	Invincible	I.	6010	280 0	54 0	23 2	2	3500	Glasgow	Napier	1870	239,441	8	5	6	10	10 9-in. M.L.R., 6 4-in., 15 M., 4 l	4	12·5	500	492
c.b. 3rd c.	Iron Duke	I.	6010	280 0	54 0	23 3	2	3500	Pembroke	Ravenhill	1871	196,479	8	5	6	10	10 9-in. M.L.R., 4 5-in., 4 20-pr., 14 M., 4 l.	4	12·5	500	492
b. 1st cl.	Implacable / Irresistible	S.	15,000	400 0	75 0	26 9	2	15,000	D'port / Chatham	..	Bldg.	..	..	..	..	..	4 12-in. B.L., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M.	2	18·0	900	755
b 1st cl.	Jupiter	S.	14,900	390 0	75 0	27 6	2	12,000	Clydeb'nk	Thomson	1897	901,216									
b 1st cl.	Magnificent	S.	14,900	390 0	75 0	27 6	2	12,000	Chatham	Penn	1895	912,291									
b 1st cl.	Majestic	S.	14,900	390 0	75 0	27 6	2	12,000	Portsm'th	Barrow	1895	910,632	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M.	5 (4 sub.)	17·5	1850	757
b 1st cl.	Mars	S.	14,900	390 0	75 0	27 6	2	12,000	Birkenh'd	Laird	1897	902,631									
a.c.	Minotaur	I.	10,690	400 0	59 4½	27 3	1	4000	Blackwall	Penn	1867	456,830	5½	4½	5½	10	17 9-in. M.L.R., 4 4·7-in. Q.F., 8 3-pr. 8 M., 3 l.	2	12·0	750	701
t. 3rd c	Monarch	I.	8930	330 0	57 6	26 7	1	8216	Chatham	Maudslay	1869	354,575	7–6	5–4½	8	12	4 12-in. M.L.R., 2 9-in. do., 1 7-in. do., 4 12-pr. Q.F., 10 3-pr., 6 M., 2 l.	2	15	630	598
x a.c.	Narcissus	S.	5600	300 0	56 0	24 6	2	8500	Hull	Earle	1889	257,390	10 comp.	16 comp.	4½	6 3–2	2 9·2-in., 10 6-in. Q.F., 6 6-pr., 10 3-pr., 6 M., 3 l.	4	18·1	900	484

x Includes Hydraulic Machinery, Gun Mountings, &c.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour: Side.	Armour: Bulk-head.	Armour: Gun Position.	Armour: Backing, Deck Plating.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
a.c.	Nelson	I. shd.	7630	280 0	60 0	26 6	2	5500	Glasgow	Elder	1880	390,855	9–6	9–6	6	13–10 - 2	4 10-in. M.L.R., 8 9-in. do., 4 4·7-in. Q.F., 6 6-pr., 14 3-pr., 7 M., 3 l.	2	13·6	1150	580
a.c.	Northampton	I. shd.	7630	280 0	60 0	25 9	2	4500	Glasgow	Penn	1878	395,804	9–6	9–6	6	13–10 3–2	4 10-in. M.L.R., 8 9-in. do., 4 4·7-in. Q.F., 8 3-pr., 10 M., 3 l.	2	12·6	1150	580
t. 2nd c.	Neptune	I. shd.	9310	300 0	63 0	26 1	1	6000	Poplar	Penn	1878	600,000 (purchas'd)	12–9	8–6	11–13	11–13 3–2	4 12·5 in. M.L.R., 2 9-in. do., 6 6-pr. Q.F., 8 3-pr., 11 M., 2 l.	2	13·4	670	412
t. 1st cl.	Nile	S.	11,940	345 0	73 0	27 6	2	12,000	Pembroke	Maudslay	1890	819,717	20–16 comp.	18–14 comp.	18 comp.	6 3	4 13·5-in., 6 4·7-in. Q.F., 8 6-pr., 12 3-pr., 7 M., 3 l.	6 (2 sub.)	16·7	1200	558
a.c.	Northumberland	I.	10,780	400 4	59 5	27 1	1	4381	Millwall	Penn	1868	471,352	5½	4½	5½	10	7 9-in. M.L.R., 20 8-in. do., 1 6-in., 1 5-in., 6 4·7-in. Q.F., 10 3-pr., 6 M., 5 l.	..	13·3	756	701
b. 1st cl	Ocean	S.	12,950	390 0	74 0	25 5	2	13,500	Devonport	Hawthorn	Bldg.	844,795	6 H. S.	12 H. S.	12–5 H. S.	3–2	4 12-in., 12 6-in. Q.F., 18 smaller Q.F., 2 l.	5 (4 sub.)	18·75	1850	700
c.d.s.	Orion	I.	4870	245 0	52 0	21 4	2	2600	Poplar	Maudslay	1882	292,229	12–7	9–5	8	16–9 3–1	4 12-in. M.L.R., 6 6-pr. Q.F., 6 M., 2 l.	4	11·9	520	284
a.c.	Orlando	S.	5600	300 0	56 0	24 8	2	8500	Jarrow	Palmer	1888	266,812	10 comp.	16 comp.	4½ comp.	6 3–2	2 9·2in., 10 6-in., 6 6-pr. Q.F., 10 3-pr., 7 M., 3 l.	2	18·1	900	484
c.d.s. c.b.	Penelope	I.	4470	260 0	50 0	17 6	2	2700	Pembroke	Maudslay	1868	186,848	6–5	4½	5	10–11	8 9-ton M.L.R., 4 3-pr. Q.F., 11 M., 4 l.	..	11·0	470	265
c.d.s.	Prince Albert	I.	3880	240 0	48 1	20 4	1	1300	Poplar	Humphrys	1866	202,666	4½	5	4½	18 ¾	4 12-ton M.L.R., 6 M., 2 l.	..	9·7	230	205
t. b. 1st cl.	Prince George	S.	14,900	390 0	75 0	27 6	2	12,000	Portsm'th	Humphrys	1896	885,037	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 2 l.	5 (4 sub.)	17·5	1850	757
b. 1st cl.	Renown	S. shd.	12,350	380 0	72 0	26 9	2	12,000	Pembroke	Maudslay	1895	696,425	8–6 H. S.	10–6 H. S.	10 H. S.	.. 3–2	4 10-in. 29-ton, 10 6-in. Q.F., 14 12-pr., 12 3-pr., 7 M., 2 l.	5 (2 sub.)	18·0	1800	674
b. 1st cl.	Ramillies	S.	14,150	380 0	75 0	27 6	2	13,000	Glasgow	Thomson	1893	874,255									
b. 1st cl.	Repulse	S.	14,150	380 0	75 0	27 6	2	13,000	Pembroke	Humphrys	1894	841,274									
b. 1st cl.	Resolution	S.	14,150	380 0	75 0	27 6	2	13,000	Jarrow	Palmer	1893	852,755									
b. 1st cl.	Revenge	S.	14,150	380 0	75 0	27 6	2	13,000	Jarrow	Palmer	1895	852,755	18–5 comp.	16 comp.	17 comp.	.. 3	4 13·5in., 10 6-in. Q.F., 16 6-pr., 12 3-pr., 8 M., 2 l.	7 (2 sub.)	17·5	1800	730
b. 1st cl.	Royal Oak	S.	14,150	380 0	75 0	27 6	2	13,000	Birkenh'd	Laird	1894	877,378									
b. 1st cl.	Royal Sovereign	S.	14,150	380 0	75 0	27 6	2	13,312	Portsm'th	Humphrys	1892	824,583									
b. 1st cl.	Rodney	S.	10,300	325 0	68 0	27 3	2	11,500	Chatham	Humphrys	1888	669,278	18 comp.	16 comp.	11 comp.	15–12 3–2½	4 13·5 in., 6 6-in. Q.F., 12 6-pr., 10 3-pr., 6 M., 2 l.	4	16·75	1200	515
c.d.s. t.	Rupert	I.	5440	250 0	53 0	23 7	2	6000	Chatham	Portsm'th	1874	232,677	11–9	12	14–12	14–10 3–2	2 9·2-in., 2 6-in., 4 6-pr. Q.F., 6 3-pr., 2 M., 2 l.	4	14·0	480	293
t. 1st cl.	Sans Pareil	I.	10,470	340 0	70 0	27 3	2	14,000	Blackwall	Humphrys	1889	x 719,442	16–18 comp.	16 comp.	18 comp.	6 3	2 16·25in., 1 10-in., 12 6-in. Q.F., 12 6-pr. 12 3-pr., 8 M., 2 l.	6 (2 sub.)	17·2	1200	583
c.d.s. t.	Scorpion	I.	2750	224 6	42 4½	16 11	1	1000	Birkenh'd	Laird	1865	110,573	4½	..	5	10–8	4 9-in. M.L.R., 6 M., 1 l.	..	8·5	320	151
a.c.	Shannon	I. shd.	5390	260 0	54 0	23 4	1	2500	Pembroke	Laird	1877	287,169	9–6	9–8	9	10–12 3–1	2 10-in. M.L.R., 7 9-in. do., 6 20-pr., 11 M., 8 l.	2	11·2	580	456
c.b. 3rd c.	Sultan	I.	9290	325 0	59 0½	27 6	1	8000	Chatham	Thomson	1871	357,415	9–6	6–4½	9–8	12–10	8 10-in. M.L.R., 4 9-in. do., 4 4·7-in. Q.F., 9 6-pr., 13 3-pr., 7 M., 2 l.	4	14·0	810	661
c.b. 2nd c.	Superb	I.	9170	332 3	59 0	26 5	1	8500	Blackwall	Maudslay	1880	443,000 (purchas'd)	12–10	10–5	10	7–12 1½	16 10-in. M.L.R., 6 4-in., 6 6-pr. Q.F., 10 3-pr., 6 M., 3 l.	4	15·0	970	654
a.c.	Sutlej	S.	12,000	440 0	69 6	26 3	2	21,000	Barrow	..	..	..	6 K.S.	5 K.S.	6 K.S.	3–2	2 9·2-in. B.L., 12 6-in. Q.F., 17 smaller Q.F.	2	21·0	800	615
c.b. 3rd c.	Swiftsure	I. shd.	6910	280 0	55 0	26 0	1	3500	Jarrow	Maudslay	1872	257,081	8–6	6–4	6	10	10 9-in. M.L.R., 8 4-in., 4 3-pr. Q.F., 12 M., 3 l.	4	12·6	540	497

x Includes Hydraulic Machinery, Gun Mountings, &c

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Completion.	Cost.	Armour. Side.	Armour. Bulk-head.	Armour. Gun Position.	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coals that can be carried in Bunkers.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.	in.	in.			knots.	tons.	
c.b. & *b.* 2nd c.	Temeraire	I. shd.	8540	285 0	62 0	27 2	2	6500	Chatham	Humphrys	1877	454,969	11–8	8–5	10–8	12–10 1½–1	4 11-in. M.L.R., 4 10-in. do., 6 4-in. 4 6-pr. Q.F., 10 3-pr., 8 M., 4 l.	2	13·8	620	592
t. 2nd c.	Thunderer	I.	9330	285 0	62 3	27 0	2	7000	Pembroke	Maudslay	1877	358,542	12–10	12–10	14–12	18–16 3–2	4 10-in., 6 6-pr. Q.F., 8 3-pr., 4 M., 2 l.	2	14·0	1600	410
t. 1st cl.	Trafalgar	S.	11,940	345 0	73 0	27 6	2	12,000	Portsm'th	Humphrys	1890	862,794 *x*	20–16 *comp.*	18–14 *comp.*	18 *comp.*	6 3	4 13·5 in., 6 6-in. Q.F., 8 6-pr., 12 3-pr., 6 M., 3 l.	6 (2 sub.)	16·7	1200	572
c.b. 3rd c.	Triumph	I. shd.	6640	280 0	55 0	26 2	1	3500	Jarrow	Maudslay	1873	258,322	8–6	6–4	6	10	10 9-in. M.L.R., 4 5-in., 8 6-pr. Q.F., 8 3-pr., 5 M., 3 l.	4	12·6	550	497
a.c.	Undaunted	S.	5600	300 0	56 0	22 6	2	8500	Jarrow	Palmer	1889	256,055	10 *comp.*	16 *comp.*	4½ *comp.*	6 3–2	2 9·2-in., 10 6-in., 6 6-pr. Q.F., 10 3-pr., 7 M., 3 l.	4	18·1	900	484
b. 1st cl.	Victorious	S.	14,900	390 0	75 0	27 6	2	12,000	Chatham	Hawthorn	1897	868,313	9 H. S.	14–9 H. S.	14–6 H. S.	.. 4–2½	4 12-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 8 M., 2 l.	5 (4 sub.)	17·5	1850	757
b. 1st cl.	Vengeance	S.	12,950	390 0	74 0	26 0	2	13,500	Barrow	Vickers	Bldg.	..	6 H.N.S.	12 H.N.S.	12–6 H.S.	4 2–1	4 12-in. B.L., 12 6-in. Q.F., 12 12-pr., 18 smaller guns.	..	18·25	800	750
a.c.	Warspite	S.	8400	315 0	62 0	27 4	2	10,000	Chatham	Penn	1888	529,332	10 *comp.*	9 *comp.*	8 *comp.*	10 3–2	4 9·2-in., 10 6-in. Q.F., 4 6-pr. Q.F., 9 3-pr., 6 M., 2 l.	6	16·7	1130	535
c.d.s. *t.*	Wivern	I.	2750	224 6	42 4	17 0	1	1000	Birkenh'd	Laird	1865	116,514	4½	..	5	8–10	4 9-in. M.L.R., 8 M., 1 l.	..	8·5	300	151
t. 1st cl.	3 Formidable class	S.	Design not settled.				..	..	Portsm'th Chatham Devonport	..											
a.c.	4 Cressy class	S.	Design not settled.				..	..	..	..											
	The following, which appear in the Official Navy List, are lent to India and Australia:—																				
c.d.s. *t.*	Abyssinia* (*Indian Marine.*)	I.	2900	225 0	42 0	14 6	6 2	900	Poplar	Dudgeon	1870	116,549	7–6	8–7	10–8	11–9 1½–1	4 8-in. 14-ton, 7 M., 2 l.	..	9·0	92	193
c.d.s. *t.*	Cerberus† (*Victorian Marine.*)	I.	3480	225 0	45 0	15 3	2	1660	Jarrow	Maudslay	1870	117,556	8–6	9–8	10–9	11–9 1½–1	4 10-in. 18-ton M.L.R., 4 M.	..	9·75	120	196
c.d.s. *t.*	Magdala* (*Indian Marine.*)	I.	3340	225 0	45 0	15 3	2	1400	Blackwall	Ravenhill	1870	132,400	8–6	9–8	10–9	11–9 1½–1	4 8-in. 14-ton, 7 M., 2 l.	..	10·0	120	194

* At Bombay. † At Melbourne.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
Sloop	Acorn	C.	970	167 0	32 0	14 0	1	1200	Milford Haven	Maudslay	1884	42,000	..	..	8 5-in. 38-cwt., 8 M., 1 l.	..	12·2	150	126
2nd cl. Cr.	Active	I. shd.	3080	270 0	42 0	21 4	1	2400	Blackwall	Humphrys	1869	126,156	..	..	10 6-in., 2 64-pr. M.L.R., 9 M., 2 l.	..	15·10	410	339
" "	Æolus	S. shd.	3600	300 0	43 0	17 6	2	9000	Devonp'rt	Hawthorn	1892	208,450	4½	2–1	2 6-in. Q.F., 6 4·7-in. 8 6-pr. 1 3-pr., 4 M., 1 l.	4	19·75	400	273
Dsp. Ves.	Alacrity	S.	1700	250 0	32 6	14 0	2	3000	Jarrow	Palmer	1885	77,969	..	..	10 6-pr. Q.F., 2 M.	..	17·00	400	114
T. G. B.	Alarm	S.	810	230 0	27 0	8 9	2	3884	Sheerness	Penn	1892	59,346	4½	..	2 4·7-in. Q.F., 4 3-pr. do.	3	19·25	100	91
2nd cl. G. B.	Albacore	C.	560	135 0	26 0	10 6	1	500	Birkenh'd	Laird	1883	28,556	..	..	2 5-in., 2 4-in., 2 M.	..	11·0	85	59
Sloop	Alert	S. shd.	960	180 0	32 6	11 6	1	1400	Sheerness	Sheerness	1894	60,309	..	..	6 4-in. 25-pr. Q.F., 4 3-pr., 2 M.	..	13·25	130	101
"	Algerine	S.	1050	185 0	32 6	11 3	2	1400	Devonp'rt	Devonport	1895	63,904	·22	..	6 4-in. 25-pr. Q.F., 4 3-pr., 3 M.	..	13·0	160	106
2nd cl. Cr.	Amphion	S.	4300	300 0	46 0	20 6	2	5000	Pembroke	Maudslay	1883	160,500	..	1½	10 6-in. Q.F., 4 3-pr., 10 M., 2 l.	4	16·6	1000*	309
" "	Andromache	S.	3400	300 0	43 0	16 6	2	9000	Chatham	Earle	1890	186,280	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
" "	Apollo	S.	3400	300 0	43 0	16 6	2	9000	Chatham	Earle	1891	186,361							
1st cl. Cr.	Andromeda	S. shd.	11,000	435 0	69 0	25 3	2	16,500	Pembroke	Hawthorn	1897	531,887	4½	3–6	16 6-in., 14 12-pr., 12 3-pr., 2 12-pr. boat.	3 (2 sub.)	20·5	1000	600
T. G. B.	Antelope	S.	810	230 0	27 0	8 9	2	3621	Devonp'rt	Yarrow	1893	61,397	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
3rd cl. Cr.	Archer	S.	1770	225 0	36 0	14 6	2	3500	Glasgow	Thomson	1885	*x*87,583	..	..	6 6-in. 8 3-pr. Q.F., 2 M., 1 l.	3	16 5	475	172

x Includes Gun Mountings, &c. * Bunker capacity.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
1st cl. Cr.	Argonaut	S. shd.	11,000	435 0	69 0	25 3	2	18,000	Fairfield	Fairfield	1897	535,557							
" "	Ariadne	S. shd.	11,000	435 0	69 0	25 3	2	18,000	Clydeb'nk	Thomson	Bldg.	543,705	3–6 H. S.	4	16 6-in. Q.F., 14 12-pr., 12 3-pr., 2 12-pr. boat.	3 (2 sub.)	20·75	1000	677
" "	Amphitrite	S. shd.	11,000	435 0	69 0	25 3	2	18,000	Barrow	Vickers	1897	546,227							
2nd cl. Cr.	Arethusa	S.	4300	300 0	46 0	20 6		5000	Glasgow	Napier	1882	145,198		1½	10 6-in., 8 3-pr. Q.F., 6 M., 2 l.	4	16·6	1000†	309
" "	Arrogant	S.	5800	320 0	57 6	21 0	2	10,000	Devonp'rt	Earle	1896	278,878	4½	1–2 N. S.	4 6-in., Q.F., 6 4·7-in., 9 12-pr., 3 3-pr., 1 12-pr. boat, 5 M.	2	19·1	500	480
" "	Astræa	S. shd.	4360	320 0	49 6	19 0	2	9112	Devonp'rt	Devonport	1893	244,831	4½	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr. 1 3-pr., 4 M., 1 l.	4	19·75	400	312
3rd cl. Cr.	Barham*	S.	1830	280 0	35 0	13 3	2	4700	Portsm'th	Hawthorn	1889	113,302	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	18·6	140	169
" "	Bellona	S.	1830	280 0	35 0	13 3	2	4700	Newcastle	Hawthorn	1890	94,195	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	17·8	140	169
" "	Barracouta	S.	1580	220 0	35 0	14 0	2	3000	Sheerness	Palmer	1889	96,315	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16·5	160	159
" "	Barrosa	S.	1580	220 0	35 0	14 0	2	3000	Portsm'th	Palmer	1889	79,238	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 3 M.	2	16·5	160	159
" "	Blanche	S. shd.	1580	220 0	35 0	14 0	2	3000	Pembroke	Earle	1889	91,112	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16·5	160	159
" "	Blonde	S. shd.	1580	220 0	35 0	14 0	2	3000	Pembroke	Earle	1889	90,059	4½	2–1	6 4·7-in. Q.F., 4 3-pr., 2 M.	2	16·5	160	159
Sloop	Basilisk	S. shd.	1170	195 0	28 0	12 6	2	2000	Sheerness	Rennie	1889	58,018	..	..	8 5-in., 8 M.	..	14·7	160	138
"	Beagle	S. shd.	1170	195 0	28 0	12 6	2	2000	Portsm'th	Rennie	1889	56,474							
1st cl. Cr.	Blake	S.	9000	375 0	65 0	25 9	2	20,000	Chatham	Maudslay	1889	440,471	6	6–3	2 9·2-in., 10 6-in. Q.F., 16 3-pr Q.F., 7 M., 2 l.	4 (2 sub.)	21·5	1500	570
" "	Blenheim	S.	9000	375 0	65 0	25 9	2	21,411	Blackwall	Humphrys	1890	425,591							
2nd cl. Cr.	Bonaventure	S. shd.	4360	320 0	49 6	19 0	2	9000	Devonp'rt	Hawthorn	1892	247,128	4½	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr. 4 M., 1 l.	4	19·5	400	312
T. G. B.	Boomerang (Australia)	S.	735	230 0	27 0	8 3	2	3500	Elswick	Bellis	1889	49,962	4½	..	2 4·7-in. Q.F., 4 3-pr., 1 M.	3	20·0	100	91
2nd cl. Cr.	Brilliant	S. shd.	3600	300 0	43 8	17 6	2	9164	Sheerness	Hawthorn	1891	204,228	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·7	400	273
3rd cl. Cr.	Brisk	S.	1770	225 0	36 0	14 3½	2	3500	Glasgow	Thomson	1886	87,583	..	..	6 6-in., 8 3-pr., Q.F., 2 M., 1 l.	3	16·5	325	172
1st cl. G. B.	Bramble	S.	700	180 0	33 0	8 0	2	1300	Liverpool	Fawcett & Co.	..	..	..	..	2 4-in., 4 12-pr. Q.F.	..	13·5	50	85
" "	Britomart	S.	700	180 0	33 0	8 0	2	1300	Liverpool	Fawcett & Co.	..	..	..	..	2 4-in., 4 12-pr. Q.F.	..	13·5	50	85
Sloop	Buzzard	C.	1140	195 0	28 0	11 6	2	2000	Sheerness	Barrow	1887	58,700	..	..	8 5-in., 8 M.	2	14·50	160	138
3rd cl. Cr.	Calliope	S. shd.	2770	235 0	44 6	19 11	1	4020	Portsm'th	Rennie	1884	120,000	..	1½	4 6-in., 12 5-in. 38-cwt., 10 M., 2 l.	2	14·6	550	293
" "	Calypso	S. shd.	2770	235 0	44 6	19 11	1	4000	Chatham	Rennie	1883	119,500							
2nd cl. Cr.	Cambrian	S. shd.	4360	320 0	49 6	19 0	2	9000	Pembroke	Hawthorn	1893	236,919	4½	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
3rd cl. Cr.	Carysfort	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Elder	1878	114,454	..	1½	2 90-cwt. M.L.R., 12 64-pr. do., 6 M., 2 l.	2	12·75	470	265
" "	Champion	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Elder	1878	113,983	..	1½	4 6-in., 8 5-in., 4 3-pr., Q.F., 6 M., 2 l.	2	12·75	470	265

* Being fitted with Thornycroft W. T. boilers.

† Bunker capacity.

GREAT BRITAIN.- Cruising Ships, &c.—*continued.*

Class.	NAME	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
3rd cl. Cr.	Cleopatra	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Humphrys	1878	113,924	..	1½	4 6-in., 8 5-in., 4 3-pr. Q.F., 6 M., 2 l.	2	13·0	470	265
" "	Comus	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Elder	1878	113,974	..	1½	10 6-in., 8 M., 2 l.	2	12·75	470	265
" "	Conquest	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Humphrys	1878	110,912	..	1½	9 6-in., 8 M., 2 l.	2	13·0	470	265
" "	Constance	S. shd.	2380	225 0	44 6	19 3	1	2000	Chatham	Penn	1880	110,000	..	1½	2 90-cwt. M.L.R., 12 64-pr., 6 M., 2 l.	2	13·0	470	265
" "	Cordelia	S. shd.	2380	225 0	44 6	19 3	1	2000	Portsm'th	Rennie	1881	104,500	..	1½	10 6-in., 10 M., 2 l.	2	12·75	470	265
Sloop	Condor	S. shd.	900	180 0	32 6	11 6	2	1400	Sheerness	Thames	..	..	..	..	6 4-in., 4 3-pr. Q.F.	..	13 2	130	130
2nd cl. Cr.	Charybdis	S. shd.	4360	320 0	49 6	19 0	2	9000	Sheerness	Earle	1893	237,344	4½	2–1	2 6-in. Q.F., 8 4·7-in, 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
T. G. B.	Circe	S.	810	230 0	27 0	8 9	2	3500	Sheerness	Penn	1892	61,979	4½	..	2 4·7-in. Q.F., 4 3-pdr.	3	19·25	100	91
2nd cl. G. B.	Cockchafer	C.	465	125 0	23 6	9 6	1	360	Pembroke	Maudslay	1881	77,000	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·8	40	61
3rd cl. Cr.	Cossack	S.	1770	225 0	36 0	14 3½	2	3500	Glasgow	Thomson	1886	*x* 87,583	..	..	6 6-in., 8 3-pr. Q.F., 2 M., 1 l.	3	16·5	325	172
1st cl. Cr.	Crescent	S. shd.	7700	360 0	60 0	23 9	2	12,000	Portsm'th	Penn	1892	383,068	6	5–1	1 9·2-in., 12 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	560
3rd cl. Cr.	Curaçoa	S. shd.	2380	225 0	44 6	19 3	1	2000	Glasgow	Humphrys	1878	112,931	..	1½	4 6-in., 8 5-in., 1 3-pr. Q.F., 9 M., 2 l.	2	13·0	470	265
1st cl. Gun Ves.	Curlew	S.	950	195 0	28 0	10 6	2	1200	Devonp'rt	Penn	1885	*x* 49,963	..	..	1 6-in. 3 5-in., 7 M.	1	14 5	250	103
Sloop	Daphne	C.	1140	195 0	28 0	11 6	2	2000	Sheerness	Greenock F'ndry Co.	1888	*x* 57,600	..	..	8 5-in., 8 M.	..	14·0	160	138
1st cl. Cr.	Diadem	S. shd.	11,000	435 0	69 0	26 0	2	16,500	Govan	Fairfield	1896	550,127	4½	3–6	16 6-in. Q.F., 14 12-pr., 12 3-pr., 2 12-pr. boat	3 (2 sub.)	20·5	1000	600
2nd cl. Cr.	Diana	S. shd.	5600	350 0	54 0	21 0	2	9600	Govan	Fairfield	1895	249,332							
" "	Dido	S. shd.	5600	350 0	54 0	21 0	2	9600	Glasgow	London and Glasgow Co.	1896	252,278	4½	2½	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 12-pr. boat.	3 (2 sub.)	19·5	550	470
" "	Doris	S. shd.	5600	350 0	54 0	21 0	2	9600	Barrow	Barrow	1896	254,029							
Sloop	Dolphin	C.	925	157 0	32 0	14 0	1	750	Middl'sbro	Hawthorn	1882	*x* 35,650	4½	..	2 6-in., 2 5-in., 3 M., 2 l.	..	11 3*	135	115
T. G. B.	Dryad	S.	1070	250 0	30 6	9 0	2	3500	Chatham	Maudslay	1893	73,491	4½	..	2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
1st cl. G. B.	Dwarf	S.	700	180 0	33 0	8 0	2	1300	Glasgow	London and Glasgow Co.	..	..	..	..	2 4-in. Q.F., 4 12-pr.	..	13.5	50	85
2nd cl. Cr.	Eclipse	S. shd.	5600	350 0	53 0	20 3	2	9600	Portsm'th	Portsm'th	1894	279,345	4½	1½–3	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 12-pr. boat.	3 (2 sub.)	19·5*	550	477
1st cl. Cr.	Edgar	S.	7350	360 0	60 0	23 9	2	12,000	Devonp'rt	Elder	1890	401,083	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·5	850	544
" "	Endymion	S.	7350	360 0	60 0	23 9	2	12,000	Hull	Earle	1891	350,459							
Sloop	Egeria	C.	940	160 0	31 4	14 3	1	700	Pembroke	Humphrys	1873	42,882	..	..	4 20-pr., 2 M., 1 l.	..	11·3	100	122
1st cl. Cr.	Europa	S. shd.	11,000	435 0	69 0	26 0	2	16,500	Clydeb'nk	Thomson	1897	561,126	4½	4	16 6-in. Q.F., 14 12-pr., 12 3-pr., 7 M.	3 (2 sub.)	20·5	1000	600
3rd cl. Cr.	Fearless	S.	1580	220 0	34 3	14 6	2	3200	Barrow	Barrow	1886	*x* 87,452	..	..	4 5-in., 8 3-pr. Q.F., 2 M., 1 l.	3 (1 sub.)	16·7	450	147
2nd cl. G. B.	Firebrand	C.	455	125 0	23 6	10 0	1	360	Glasgow	Thomson	1877	22,800	..	..	2 5-in., 2 4-in., 2 M.	..	10·17	40	61
2nd cl. Cr.	Flora	S. shd.	4360	320 0	49 6	19 0	2	9000	Pembroke	Barrow	1893	241,819							
" "	Forte	S. shd.	4360	320 0	49 6	19 0	2	9000	Chatham	Chatham	1893	240,816	4½	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312
" "	Fox	S. shd.	4360	320 0	49 6	19 0	2	9000	Portsm'th	Portsm'th	1893	244,078							
" "	Forth	S.	4050	300 0	46 0	20 0	2	5700	Pembroke	Hawthorn	1886	201,952	4	3–2	2 8-in., 10 6-in., 3 6-pr. Q.F., 8 3-pr., 6 M., 2 l.	2	16·8	900	326
" "	Furious	S. shd.	5800	320 0	57 6	22 0	2	10,000	Devonp'rt	Earle	1896	280,772	4½	1–2	4 6-in. Q.F., 6 4·7 in., 8 12-pr., 3 3-pr., 1 12-pr. boat, 5 M.	2	19·0	500	480
" "	Gladiator	S. shd.	5800	320 0	57 6	22 0	2	10,000	Portsm'th	Maudslay	1896	281,838							

x Includes Gun Mountings, &c.

† Eclipse, Diana, Doris: trial, 20·1 knots.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
1st cl. Cr.	Gibraltar	S. shd.	7700	360 0	60 0	23 9	2	12,000	Glasgow	Napier	1892	347,634	6	5–1	2 9·2-in., 10 6-in. Q.F. 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	544
T. G. B.	Gleaner	S.	735	230 0	27 0	8 3	2	3600	Sheerness	Sheerness	1890	63,798	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	19·0	100	91
"	Gossamer	S.	735	230 0	27 0	8 3	2	3600	Sheerness	Sheerness	1890	54,490							
1st cl. G. B.	Goldfinch	C.	805	165 0	31 0	11 7½	1	1200	Sheerness	Sheerness	1889	40,889	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
1st cl. Cr.	Grafton	S.	7350	360 0	60 0	23 9	2	12,000	Blackwall	Humphrys	1892	351,851	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	560
T. G. B.	Grasshopper	S.	525	200 0	23 0	8 9	2	2700	Sheerness	Maudslay	1887	*x* 34,065	..	..	1 4-in., 6 3-pr. Q.F.	4	17·0	80	67
"	Halcyon	S.	1070	250 0	30 6	9 0	2	3500	Devonp'rt	Hawthorn	1894	75,091	4½		2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
"	Harrier	S.	1070	250 0	30 6	9 0	2	3500	Devonp'rt	Hawthorn	1894	73,428							
1st cl. Cr.	Hawke	S.	7350	360 0	60 0	23 9	2	12,000	Chatham	Elder	1891	365,491	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	544
T. G. B.	Hazard	S.	1070	250 0	30 6	9 0	2	3500	Pembroke	Elder	1894	74,076	4½		2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
"	Hebe	S.	810	230 0	27 0	8 9	2	3566	Sheerness	Sheerness	1892	73,433	4½		2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
T. D. S.	Hecla	I.	6400	391 7	38 9	24 3	1	2400	Belfast	Harland & Wolff	1878	126,190	..		4 64-pr. M.L.R., 1 5-in., 1 40-pr., 14 M.	4	13·0	2,200	277
2nd cl. Cr.	Hermes	S. shd.	5600	350 0	54 0	21 0	2	10,000	Glasgow	Fairfield	Bldg.	..	4½	1½–3	11 6-in. Q.F., 15 smaller Q.F.	..	20·0	550	477
" "	Highflyer	S. shd.	5600	350 0	54 0	21 0	2	10,000	"	"	Bldg.	..							
" "	Hyacinth	S. shd.	5600	350 0	54 0	21 0	2	10,000	"	London and Glasgow Co.	Bldg.	..							
" "	Hermione	S. shd.	4360	320 0	49 6	19 0	2	9000	Devonp'rt	Thomson	1893	223,267	4½	2–1	2 6-in. Q.F., 8 4·7-in., 8 6-pr., 1 3-pr. 4 M., 1 l.	4	19·5	400	312
T. G. B.	Hussar	S.	1070	250 0	30 6	9 0	2	3500	Devonp'rt	Hawthorn	1894	72,886	4½	..	2 4·7-in. Q.F., 4 6-pr.	3	19·0	100	120
Sloop	Icarus	C.	970	167 0	32 0	13 6	1	1200	Devonp'rt	Barrow	1885	*x* 52,104	..	..	8 5-in., 4 3-pr. Q.F., 4 M. 1 l.	..	12·2	150	126
2nd cl. Cr.	Inconstant	I. shd.	5780	337 4	50 3	25 6	1	4200	Pembroke	Penn	1868	213,324	..	..	6 6½-ton M.L.R., 2 3-pr. Q.F., 11 M., 8 l.	..	16·20	750	631
" "	Indefatigable	S. shd.	3600	300 0	43 8	17 6	2	9000	Glasgow	London and Glasgow	1891	181,024	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	273
" "	Intrepid	S. shd.	3600	300 0	43 8	17 6	2	9000	Glasgow	London and Glasgow	1891	181,157							
" "	Iphigenia	S. shd.	3600	300 0	43 8	17 6	2	9000	Glasgow	London and Glasgow	1891	181,879							
" "	Iris	S.	3730	300 0	46 0	22 0	2	6000	Pembroke	Maudslay	1877	213,186	..	..	13 5-in., 4 3-pr. Q.F., 8 M., 1 l.	3	18·0	780	450
" "	Isis	S. shd	5600	350 0	54 0	21 0	2	9600	Glasgow	London and Glasgow Co.	1896	252,067	4½	2½	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 12-pr. boat.	4 (2 sub.)	19·5*	550	470
" "	Juno	S. shd.	5600	350 0	54 0	21 0	2	9600	Barrow	Barrow	1895	254,097							
T. G. B.	Jaseur	S.	810	230 0	27 0	8 9	2	3711	Barrow	Barrow	1892	48,238	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
"	Jason	S.	810	230 0	27 0	8 9	2	3540	Barrow	Barrow	1892	49,253							
"	Karrakatta (Australia)	S.	735	230 0	27 0	8 3	2	3500	Elswick	Bellis	1890	*x* 47,619	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	20·0	100	91

x Includes Gun Mountings, &c.

* Isis: trial, 20·1 knots; Juno, 20 knots.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no					£	in.	in.			knots.	tons.	
3rd cl. Cr.	Katoomba (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Elswick	Hawthorn	1889	116,719	4½	2–1	8 4·7-in. Q.F., 8 3-pr. 4 M., 1 l.	4	19·0	300	217
1st cl. G. V.	Landrail	S.	950	195 0	28 0	10 6	2	1200	Devonp'rt	Penn	1886	49,963	..	..	1 6-in., 3 5-in., 4 3-pr. Q.F., 3 M.	..	14·5	250	46
1st cl. G. B.	Lapwing	C.	805	165 0	31 0	11 7½	2	1200	Devonp'rt	Devonport	1889	39,952	..	..	6 4-in. 25-cwt., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
2nd cl. Cr.	Latona	S.	3400	300 0	43 0	16 6	2	9000	Barrow	Barrow	1890	171,068	4½	2–1	2 6-in.Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
" "	Leander	S.	4300	300 0	46 0	20 6	2	5000	Glasgow	Napier	1882	148,453	..	1½	10 6-in. Q.F., 4 3-pr., 10 M., 2 l.	4	16·6	1000*	309
T. G. B.	Leda	S.	810	230 0	27 0	8 9	2	3597	Sheerness	Penn	1892	62,145	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
2nd cl. G. V.	Linnet	C.	756	165 0	29 0	10 11	2	870	Blackwall	Rennie	1880	35,663	..	..	2 90-cwt. M.L.R., 4 6-pr. Q.F., 2 M.	..	11·80	180	92
1st cl. G. B.	Lizard	C.	715	165 0	29 0	11 10	1	1000	Belfast	Harland	1886	52,770	..	..	6 4-in., 4 M.	..	13·0	105	76
3rd cl. Crs.	Magicienne, Marathon	S. shd.	2950	265 0	42 0	17 6	2	9000	Glasgow	Hawthorn	1888	136,000	..	1½	6 6-in., 9 6-pr. Q.F., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
1st cl. G. B.	Magpie	C.	805	165 0	31 0	11 7½	1	1200	Pembroke	Earle	1889	x 38,700	..	..	6 4-in., 4 M.	..	13·0	105	76
3rd cl. Crs.	Medea, Medusa	S.	2800	265 0	41 0	16 6	2	9000	Chatham	Humphrys	1888	x 141,700	..	1½	6 6-in., 9 6-pr. Q.F., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
2nd cl. Cr.	Melampus	S.	3400	300 0	43 0	16 6	2	9000	Barrow	Barrow	1890	171,635	4½	2–1	2 6-in. Q.F., 6 4·7 in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
Sloop	Melita	C.	970	167 0	32 0	13 6	1	1200	Malta	Malta Dock Yard	1888	60,179	..	..	8 5-in., 8 M., 1 l.	..	12·50	150	125
3rd cl. Cr.	Melpomene	S. shd.	2950	265 0	41 0	17 6	2	9000	Portsm'th	Palmer Co.	1888	x 142,000	..	1½	6 6-in. Q.F., 9 6-pr., 1 3-pr., 3 M., 1 l.	4	19·0	400	218
2nd cl. Cr.	Mercury	S.	3730	300 0	46 0	20 2	2	6000	Pembroke	Maudslay	1878	213,252	..	..	13 5-in., 6 3-pr. Q.F., 9 M., 1 l.	4	16·8	780	291
" "	Mersey	S.	4050	300 0	46 0	19 6	2	6000	Chatham	Humphrys	1885	154,000	4	3–2	2 15-ton, 10 6-in., 3 6-pr.Q.F., 8 3-pr. 5 M., 2 l.	4	17·3	900	327
3rd cl. Cr.	Mildura (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Elswick	Hawthorn	1889	116,062	4½	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·0	300	217
2nd cl. Cr.	Minerva	S. shd.	5600	350 0	53 0	20 6	2	9600	Chatham	Chatham	1895	244,046	4½	1½–3	5 6-in.Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 12-pr. boat.	3 (2 sub.)	19·5†	550	437
3rd cl. Cr.	Mohawk	S.	1770	225 0	36 0	14 6	2	3500	Glasgow	Thomson	1886	x 87,583	..	..	6 6-in., 8 3-pr. Q.F., 2 M., 1 l.	3	16·5	475	172
2nd cl. Cr.	Naiad	S.	3400	300 0	43 0	16 6	2	9000	Barrow	Barrow	1890	171,445	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
1st cl. Cr.	Niobe	S. shd.	11,000	435 0	69 0	26 0	2	16,500	Barrow	Vickers	1897	552,692	4½	3–6	16 6-in. Q.F., 14 12-pr., 12 3-pr., 2 12-pr. boat.	3 (2 sub.)	20·5	1000	600
Sloop	Nymphe	C.	1140	195 0	28 0	12 6	1	2000	Portsm'th	Greenock F'ndry Co.	1888	x 57,600	..	..	8 5-in., 8 M.	..	14·0	160	138
T. G. B.	Niger	S.	810	230 0	27 0	8 9	2	3784	Barrow	Barrow	1892	48,177	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	19·25	100	91
"	Onyx	S.	810	230 0	27 0	8 9	2	3548	Birkenh'd	Laird	1892	53,961							
3rd cl. Cr.	Pallas	S.	2575	265 0	41 0	15 6	2	7610	Portsm'th	Hawthorn	1890	148,828	4½	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·0	300	217
" "	Pearl	S.	2575	265 0	41 0	15 6	2	7500	Pembroke	Earle	1890	151,693							
1st cl. G. B.	Partridge	C.	755	165 0	30 0	11 4	1	1200	Devonp'rt	Devonport	1888	37,800	..	..	6 4-in., 4 M.	..	13·25	105	76
" "	Peacock	C.	755	165 0	30 0	11 4	1	1200	Pembroke	Barrow Co.	1888	37,600							
Sloop	Pelican	C.	1130	170 0	36 0	15 3	1	800	Devonp'rt	Humphrys	1872	56,221	..	..	2 6-in., 6 5-in., 4 M., 1 l.	..	10·6	130	145

x Includes Gun Mountings, &c. * Bunker capacity. † Minerva: trial, 20·3 knots.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
3rd cl. Cr.	Pactolus	S.	2135	300	36 6	17 0	2	7000	Elswick	Penn	1897	139,736							
" "	Pandora	S.	2200	305	36 9	17 6	2	7000	Portsm'th	Portsm'th	Bldg.	..							
" "	Pegasus	S.	2135	300	36 6	17 0	2	7000	Jarrow	Palmer	1897	135,071							
" "	Pelorus	S.	2135	300	36 6	17 0	2	7000	Sheerness	Thomson	1896	..							
" "	Perseus	S.	2135	300	36 6	17 0	2	7000	Hull	Earle	1898	127,992							
" "	Pioneer	S.	2200	305	36 9	17 6	2	7000	Chatham	Fairfield	Bldg.	..	·22	2	8 4-in. Q.F., 8 3-pr., 2 l.	2	20·0*	250	224
" "	Pomone	S.	2135	300	36 6	17 0	2	7000	Sheerness	Penn	1897	147,169							
" "	Prometheus	S.	2135	300	36 6	17 0	2	7000	Hull	Earle	1898	127,975							
" "	Psyche	S.	2200	305	36 9	17 6	2	7000	Devonp'rt	Devonport	Bldg.	..							
" "	Proserpine	S.	2135	300	36 6	17 0	2	7000	Sheerness	Devonport	1896	159,136							
" "	Pyramus	S.	2135	300	36 6	17 0	2	7000	Jarrow	Palmer	Bldg.	135,096							
Sloop	Penguin	C.	1130	170 0	36 0	16 1	1	700	Glasgow	Hawthorn	1876	52,111	..	..	2 64-pr. M.L.R., 2 M., 1 l.	..	11·0	150	145
2nd cl. Cr.	Phaeton	S.	4300	300 0	46 0	20 6	2	5000	Glasgow	Napier	1883	145,198	..	1½	10 6-in. Q.F., 4 3-pr., 10 M., 2 l.	4	16·6	1000†	309
1st cl. G. B.	Pheasant	C.	755	165 0	29 0	11 4	1	1200	Devonp'rt	Devonport	1888	x 37,800	..	..	6 4-in., 4 M.	..	13·25	105	76
3rd cl. Cr.	Philomel	S.	2575	265 0	41 0	15 6	2	7500	Devonp'rt	Earle	1890	156,102	4½	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	2	19·0	300	217
" "	Phœbe	S.	2575	265 0	41 0	15 6	2	7500	Devonp'rt	Devonport	1890	161,154							
Sloop	Phœnix	S. shd.	1050	185 0	32 6	11 3	2	1400	Devonp'rt	Devonport	1895	63,930	·22	..	6 4-in. Q.F., 4 3-pr., 3 M.	..	13·0	160	106
1st cl. G. B.	Pigeon	C.	755	165 0	30 0	11 4	1	1200	Pembroke	Barrow	1888	x 37,800							
" "	Pigmy	C.	755	165 0	30 0	11 4	1	1200	Sheerness	Barrow	1888	37,700	..	..	6 4-in., 4 M.	..	13·25	105	76
" "	Plover	C.	755	165 0	30 0	11 4	1	1200	Pembroke	Barrow	1888	37,700							
2nd cl. Cr.	Pique	S. shd.	3600	300 0	43 8	17 6	2	9000	Jarrow	Palmer	1890	184,108	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	273
T. Ram	Polyphemus	S.	2640	240 0	40 0	20 0	2	5500	Chatham	Humphrys	1881	174,450	..	3–2	6 6-pr. Q.F., 2 M.	5	18·0	300	..
3rd cl. Cr.	Porpoise	S.	1770	225 0	36 0	14 6	2	3500	Glasgow	Thomson	1886	87,583	..	..	6 6-in., 8 3-pr. Q.F., 2 M., 1 l.	3	16·5	475	172
1st cl. Cr.	Powerful	S. shd.	14,200	500 0	71 0	29 0	2	25,000	Barrow	Barrow	1895	674,879	6	3–6	2 9·2-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 9 M., 2 12-pr. boat	4	22·0‡	1500§	840
3rd cl. Cr.	Pylades	C.	1420	200 0	38 0	15 9	1	1400	Sheerness	Laird	1884	62,000	..	1¼	14 5-in., 8 M., 1 l.	..	12·6	400	170
Sloop	Racer	C.	970	167 0	32 0	14 0	1	850	Devonp'rt	Hawthorn	1884	49,000	..	..	8 5-in., 8 M., 1 l.	..	11·0	150	125
3rd cl. Cr.	Racoon	S.	1770	225 0	36 0	13 6	2	4500	Devonp'rt	Harland	1887	x 91,606	..	..	6 6-in., 8 3-pr. Q.F., 2 M., 1 l.	3	17·5	475	176
2nd cl. Cr.	Rainbow	S. shd.	3600	300 0	43 8	17 6	2	9681	Jarrow	Palmer	1891	184,086	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·7	400	273
" "	Raleigh	I. shd.	5200	298 0	49 0	24 7	1	4200	Chatham	Humphrys	1873	193,386	..	..	8 90-cwt. M.L.R., 8 6-in., 8 5-in., 12 M., 4 l.	2	13·9	550	571
2nd cl. G. Ves.	Rambler	C.	835	157 0	29 6	13 7	1	650	Glasgow	Elder	1880	37,038	..	..	2 20-pr., 1 M., 1 l.	..	10·66	40	160
3rd cl. Cr.	Rapid	C.	1420	200 0	38 0	15 9	1	1400	Devonp'rt	Maudslay	1883	68,226	..	1¼	2 6-in., 10 5-in., 4 M., 1 l.	..	12·6	400	171
1st cl. G. B.	Rattler	C.	715	165 0	29 0	11 0	1	1200	Elswick	Hawthorn	1886	x 38,734	..	..	6 4-in., 4 M.	..	13·6	105	76
T. G. B.	Rattlesnake	S.	550	200 0	23 0	8 0	2	2700	Birkenh'd	Laird	1886	x 35,425	..	..	1 4-in., 6 3-pr. Q.F.	4	18·5	100	67
2nd cl. G. B.	Raven	C.	465	125 0	23 6	10 0	1	360	Poplar	Rennie	1882	21,050	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·5	40	62
1st cl. G. B.	Redbreast	C.	805	165 0	31 0	11 7½	1	1200	Pembroke	Earle	1888	38,700	..	..	6 4-in., 4 M.	..	13·0	105	76
" "	Redpole																		
2nd cl. G. B.	Redwing	C.	461	125 0	23 6	10 0	1	360	Pembroke	Maudslay	1880	22,200	..	..	2 20-cwt., 2 M.	..	9·68	40	..
T. G. B.	Renard	S.	810	230 0	27 0	8 9	2	3500	Birkenh'd	Laird	1892	53,848	4½	..	2 4·7 in. Q.F., 4 3-pr.	3	19·25	100	91

x Includes Gun Mountings, &c. * Pelorus: trial, 20·7 knots. † Bunker capacity. ‡ Trial, 21·8 knots. § Bunker capacity, 3000

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					£	in.	in.			knots.	tons.	
2nd cl. Cr.	Retribution	S. shd.	3600	300 0	43 8	17 6	2	9000	Jarrow	Palmer	1891	183,975	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	275
3rd cl. Cr.	Ringarooma (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Glasgow	Thomson	1890	128,076	4½	2–1	8 4·7-in. Q.F., 8 3-pr. Q.F., 4 M., 1 l.	4	19·0	300	216
1st cl. G. B.	Ringdove	C.	805	165 0	31 5	11 7½	1	1200	Devonp'rt	Devonport	1889	39,753	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
1st cl. Cr.	Royal Arthur	S. shd.	7700	360 0	60 0	27 9	2	12,000	Portsm'th	Maudslay	1891	402,414	6	5–1	1 9·2-in., 12 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	19·7	850	567
Sloop	Rosario	S. shd.	960	180 0	32 6	11 6	2	1400	Sheerness	Governm't	..	..	..	..	6 4-in., 4 3-pr. Q.F.	..	13·2	130	130
3rd cl. Cr.	Royalist	C.	1420	200 0	38 0	15 9	1	1400	Devonp'rt	Maudslay	1883	68,173	..	1¼	2 6-in., 10 5-in., 4 M., 1 l.	..	12·6	400	171
1st cl. Cr.	St. George	S. shd.	7700	360 0	60 8	23 9	2	12,000	Hull	Maudslay	1892	377,204	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M. 2 l.	4 (2 sub.)	19·7	850	559
T. G. B.	Salamander	S.	735	230 0	27 0	8 3	2	3500	Chatham	Maudslay	1889	57,911	4½	..	2 4·7-in. Q.F., 4 3-pr. Q.F.	3	20·0	100	91
" "	Sandfly	S.	525	200 0	23 0	8 9	2	2700	Devonp'rt	Maudslay	1887	x 36,167	·22	..	1 4-in., 6 3-pr. Q.F.	4	19·0	80	67
2nd cl. Cr.	Sappho	S.	3400	300 0	43 0	16 6	2	9861	Poplar	Penn	1891	171,853	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·47	400	273
3rd cl. Cr.	Satellite	C.	1420	200 0	38 0	15 9	1	1400	Sheerness	Humphrys	1881	62,900	..	1¼	2 6-in., 6 5-in., 4 M., 1 l.	..	12·6	400	167
" "	Scout	S.	1580	220 0	34 0	14 6	2	3200	Glasgow	Thomson	1885	x 87,516	..	..	4 5-in., 8 3-pr. Q.F., 2 M., 1 l.	3 (1 sub.)	16·7	450	147
2nd cl. Cr.	Scylla	S.	3400	300 0	43 0	16 6	2	9280	Poplar	Penn	1892	171,593	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·62	400	273
T. G. B.	Seagull	S.	735	230 0	27 0	8 3	2	3500	Chatham	Maudslay	1889	56,922							
" "	Sharpshooter	S.	735	230 0	27 0	8 3	2	3500	Devonp'rt	Bellis	1888	x 50,029							
" "	Sheldrake	S.	735	230 0	27 0	8 3	2	3500	Chatham	Maudslay	1889	57,800	4½	..	2 4·7-in., 4 3-pr. Q.F.	3	20·0	100	91
" "	Skipjack	S.	735	230 0	27 0	8 3	2	3500	Chatham	Laird	1889	59,531							
" "	Spanker†	S.	735	230 0	27 0	8 3	2	3500	Devonp'rt	Bellis	1889	50,000							
" "	Speedwell	S.	735	230 0	27 0	8 3	2	3500	Devonp'rt	Laird	1889	52,000							
1st cl. Cr.	Spartiate	S. shd.	11,000	435 0	69 0	26 0	2	16,500	Pembroke	Maudslay	Bldg.	518,623	4½	3–6	16 6-in. Q.F., 14 12-pr., 12 3-pr., 2 12-pr. boat.	3 (2 sub.)	20·5	1000	600
2nd cl. Cr.	Severn	S.	4050	300 0	46 0	19 6	2	6000	Chatham	Humphrys	1885	x 212,621	4	3–2	2 8-in., 10 6-in. Q.F., 3 6-pr., 2 3-pr., 10 M., 2 l.	..	17·3	900	327
" "	Sirius	S. shd.	3600	300 0	43 8	17 6	2	9000	Elswick	Maudslay	1890	186,649	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	273
" "	Spartan	S. shd.	3600	300 0	43 8	17 6	2	9000	Elswick	Maudslay	1891	186,351							
1st cl. G. B.	Sparrow	C.	805	165 0	31 0	11 7½	1	1200	Greenock	Greenock	1889	39,000	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
T. G. B.	Speedy	S.	810	230 0	27 0	8 9	2	4703	Chiswick	Thornycrft	1893	58,927	4½	..	2 4·7-in. Q.F., 4 3-pr.	3	20·21	100	91
" "	Spider	S.	525	200 0	23 0	8 9	2	2700	Devonp'rt	Maudslay	1887	x 36,300	·22	..	1 4-in., 6 3-pr. Q.F.	4	19·0	80	67
2nd cl. G. B.	Starling	C.	465	125 0	23 6	10 0	1	360	Poplar	Rennie	1882	21,100	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·5	40	61
" "	Stork	C.	465	125 0	23 6	10 0	1	360	Poplar	Rennie	1882	21,150	..	..	1 M., 2 l.	..	9·5	40	..
D. V.	Surprise	S.	1650	250 0	32 6	14 0	2	3000	Jarrow	Palmer	1885	x 78,764	..	..	4 5-in., 4 6-pr. Q.F., 2 M	..	17·0	400	114
Sloop	Swallow	C.	1130	195 0	28 0	11 6	2	1500	Sheerness	Rennie	1885	59,797	..	..	8 5-in., 8 M.	..	13·5	280	135

† Du Temple W. T. boilers; trial: 3920 H.P., 20 knots.

x Includes Gun Mountings, &c.

T

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour: Gun Position.	Armour: Deck.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.						£	in.	in.			knots.	tons.	
2nd cl. G. V.	**Swift**	C.	756	165 0	29 0	10 11	2	870	Blackwall	Rennie	1879	34,670	..	..	2 90-cwt. M.L.R., 4 6-pr. Q.F., 2 M.	..	11·81	180	92
2nd cl. Cr.	**Sybille**	S.	3400	300 0	42 0	16 6	2	9496	Stephenson	Hawthorn	1890	174,670	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
" "	**Talbot**	S. shd.	5600	350 0	53 6	21 0	2	9600	Devonp'rt	Devonport	1895	273,856	4½	1½–3	5 6-in. Q.F., 6 4·7-in., 9 12-pr., 1 3-pr., 4 M., 1 l.	3 (2 sub.)	19·5*	550	433
3rd cl. Cr.	**Tartar**	S.	1770	225 0	36 0	14 3½	2	3500	Glasgow	Thomson	1886	*x* 87,583	..	..	6 6-in., 8 3-pr. Q.F., 2 M., 1 l.	3	16·5	325	177
" "	**Tauranga** (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Glasgow	Thomson	1889	128,101	4½	2–1	8 4·7-in. Q.F., 8 3-pr. Q.F., 4 M., 1 l.	4	19·0	300	212
2nd cl. Cr.	**Terpsichore**	S.	3400	300 0	43 0	16 6	2	9000	Glasgow	Thomson	1890	173,341	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 13-pr., 9 M., 1 l.	4	20·0	400	275
1st cl. Cr.	**Terrible**	S. shd.	14,200	500 0	71 0	27 0	2	25,000	Glasgow	Thomson	1895	681,419	6	3–6	2 9·2-in., 12 6-in. Q.F., 18 12-pr., 12 3-pr., 9 M., 2 12-pr. boat.	4	22·4 (*t*)	3000	840
2nd cl. Cr.	**Thames**	S.	4050	300 0	46 0	19 6	2	5700	Pembroke	Penn	1885	205,452	4	3–2	2 8-in., 10 6-in., 3 6-pr. Q.F., 8 3-pr., 6 M., 2 l.	2	16·8	900	326
1st cl. G. B.	**Thistle**	S.	700	180 0	33 0	8 0	2	1300	Glasgow	London and Glasgow Co.	..	..	..	..	2 4-in. Q.F., 4 12-pr.	..	13·5	50	85
1st cl. Cr.	**Theseus**	S.	7350	360 0	60 0	23 9	2	12,000	Blackwall	Maudslay	1892	347,577	6	5–1	2 9·2-in., 10 6-in. Q.F., 12 6-pr., 5 3-pr., 7 M., 2 l.	4 (2 sub.)	20·0	850	544
2nd cl. Cr.	**Thetis**	S.	3400	300 0	43 0	16 6	2	9000	Glasgow	Thomson	1890	173,146	4½	2–1	2 6-in. Q.F., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
" "	**Tribune**	S.	3400	300 0	43 0	16 6	2	9000	Glasgow	Thomson	1891	173,006							
1st cl. G. B.	**Thrush**	C.	805	165 0	31 0	11 7½	1	1200	Greenock	Greenock F'ndry Co.	1889	39,000	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
Sloop	Torch	S. shd.	960	180 0	32 6	11 6	1	1400	Sheerness	Sheerness	1894	60,564	..	..	6 4-in. Q.F., 4 3-pr., 2 M.	..	13·25	130	..
"	2 Unnamed		Details not yet settled.					..	..	..	..	..	..	..	..	..	..	..	..
2nd cl. Cr.	**Venus**	S. shd.	5600	350 0	54 0	21 2	2	9600	Glasgow	Elder	1895	249,938	4½	2½	5 6-in. Q.F., 6 4·7-in., 8 12-pr., 7 3-pr., 4 M., 1 12-pr. boat	3 (2 sub.)	19·5*	550	470
2nd cl. Cr.	**Vindictive**	S.	5800	320 0	54 0	20 6	2	10,000	Chatham	Chatham	1896	290,458	4½	1–2 N.S.	4 6-in. Q.F., 6 4·7-in., 8 12-pr., 3 3-pr., 1 12-pr. boat, 5 M.	2	19·5	500	450
2nd cl. Cr.	**Volage**	I. shd.	3080	270 0	42 0	22 0	1	2400	Blackwall	Ravenhill	1874	132,817	..	..	10 6-in., 2 64-pr. M.L.R., 10 M., 2 l.	..	12·8	420	339
T. D. S.	**Vulcan**	S.	6620	350 0	58 0	23 0	2	12,032	Portsm'th	Humphrys	1889	370,447	4½	5–2½	8 4·7-in. Q.F., 12 3-pr., 16 M., 1 l.	6 (2 sub.)	20·0	1000	433
3rd cl. Cr.	**Wallaroo** (Australia)	S.	2575	265 0	41 0	15 6	2	7500	Elswick	Hawthorn	1889	115,995	4½	2–1	8 4·7-in. Q.F., 8 3-pr., 4 M., 1 l.	4	19·0	300	218
1st cl. G. B.	**Widgeon**	C.	805	165 0	30 0	11 7½	1	1200	Pembroke	Rennie	1889	39,315	..	..	6 4-in., 2 3-pr. Q.F., 2 M.	..	13·0	105	76
2nd cl. G. B.	**Wrangler**	C.	465	125 0	23 6	10 6	1	360	Barrow	Barrow	1880	22,727	..	..	2 64-pr. M.L.R., 2 20-pr., 2 M.	..	9·88	40	61

x Includes Gun Mountings, &c.

* Talbot: trial, 20 knots; Venus, 20·1 knots.

Paddle Wheel Vessels.—Adventure, Alecto, Cockatrice, Dove, Herald, Mosquito, Pioneer, Research (surveying vessel), Sphinx, Triton (surveying vessel).
Twin Screw Gun Boats (Iron).—Dee, Don, Esk, Medina, Medway, Sabrina, Slaney, Spey, Tay, Tees, Trent, Tweed, 373 tons; 320 to 410 I.H.P.
Twin Screw Iron or Steel Gun Boats (Staunch Type).—Ant, Arrow, Badger, Blazer, Bloodhound, Bonnetta, Bouncer, Bulldog, Bustard, Comet, Cuckoo, Fidget, Gadfly, Griper, Hyena, Insolent, Kite, Mastiff, Pickle, Pike, Pincher, Plucky, Scourge, Snake, Snap, Staunch, Tickler, Weasel, 180 to 254 tons; 130 to 270 I.H.P.

Royal Naval Reserved Merchant Cruisers.

—	Name.		Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
				Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an Annual subvention and permitted to fly the blue ensign.	Campania		Cunard Company	610	65	26	12,950	30,000	21
	Lucania		" "	610	65	26	12,950	30,000	21
	Himalaya		Peninsular and Oriental Co.	465½	52	22½	6,898	10,000	17
	Australia		" " "	465½	52	22½	6,901	10,000	17
	Victoria		" " "	466	52	22½	6,091	7,000	16
	Arcadia		" " "	466	52	22½	6,188	7,000	16
	Majestic	2 s.	White Star Company	565	58	24½	9,965	16,000	20
	Teutonic	2 s.	" "	565	58	24½	9,984	16,000	20
	Empress of India	2 s.	Canadian Pacific Railway Co.	440	51	24½	5,905	10,000	16
	Empress of China	2 s.	" " "	440	51	24½	5,905	10,000	16
	Empress of Japan	2 s.	" " "	440	51	24½	5,905	10,000	16
Ships held at the disposition of the Admiralty without subsidy.	Etruria		Cunard Company	501½	57	26	8,120	14,500	19½
	Umbria		" "	501½	57	26	8,128	14,500	19½
	Servia		" "	515	52	26	7,392	10,000	16½
	Gallia		" "	430	44½	24	4,809	5,300	15½
	Aurania		" "	470	57	27	7,269	9,500	17
	Britannic		White Star Company	455	45	25	5,004	5,200	16
	Germanic		" "	455	45	25	5,008	5,200	16
	Adriatic		" "	437	40½	23	3,888	3,600	15
	Britannia		Peninsular and Oriental Co.	466	52	22½	6,061	7,000	16
	Oceana		" " "	466	52	22½	6,188	6,000	16
	Peninsular		" " "	410½	48	..	5,000	4,972	15
	Oriental		" " "	410½	48	..	5,000	4,972	15
	Valetta		" " "	420½	45	22½	4,904	5,000	15
	Massilia		" " "	420½	45	22½	4,902	5,000	15
	Rome		" " "	430	44½	22½	5,545	5,500	15
	Carthage		" " "	430	44½	22½	4,879	5,000	15
	Ballarat		" " "	420	43	22½	4,748	4,500	14
	Parramatta		" " "	420	43	22½	4,756	4,500	14

There are also numerous ships on the Admiralty List complying with Admiralty conditions as to subdivision which have no national tie. They are suitable for receiving an armament, but there is no arrangement with Owners, except the promise of preference for occasional State employment.

GREAT BRITAIN, COLONIES, &c.—Cruising Ships, Gunboats, &c.

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Stowage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
INDIA	T. G.B.	Assaye	Steel	2	Elswick	1891	230 0	27 0	8 3	735	3,500	19·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 3 l. car.
	D. V.	Lawrence	Steel	Pad.	B'kenh'd	1886	212 2	32 2	18 3	1,154	1,277	13·5	270	Four 4-inch B.L.R., 4 6-pr. Q.F., 4 M.
	T. G. B.	Plassy	Steel	2	Elswick	1890	230 0	27 0	8 3	735	3,500	19·0	100	2 4·7-in. Q.F., 4 3-pr. do., 1 f. tu. & 3 l. car.
QUE'NSLAND.	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; 2 M.
	Gun-vessel	Paluma	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	340	10·0	..	One 8-in. 11½-ton; one 6-in. 4-ton; one 3-pr. Q.F.; 2 M.
SOUTH AUSTRALIA	Cruiser	Protector	Steel	2	..	1884	188 0	3 0	12 6	920	1,640	14·0	..	One 8-in. 11½-ton; five 6-in. 4-ton; five Gatlings.

The five second-class Cruisers, and the two Torpedo-Gunboats of the Australian Auxiliary Squadron, are included in the list of Ships of the Royal Navy, as well as the armour-clads Abyssinia, Cerberus, and Magdala.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Battery. or Turret.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
c.b.	Almirante Brown .	S.	4267	240 0	50 0	20 6	2	4500	Poplar .	1880	190,000	9 (cp.)	8 (cp.)	1½	8 8-in. (Armstrong), 6 4·7-in. Q.F., 2 3-pr., 6 M.	2	13·75	650	350
c.d.s.t.	Andes . . .	I.	1558	186 0	44 0	9 6	2	750	Birkenhead .	1875	85,600	6	9	1	2 11-in., 2 4·7-in., 4 M. . .	..	9·5	120	120
c.d.s.t.	Plata . . .	I.	1558	186 0	44 0	9 6	2	750	Birkenhead .	1874	85,600								
a.c.	Garibaldi (ex Giuseppe Garibaldi I.)	S.	6840	328 0	59 8	24 0	2	13,384 (*t*)	Sestri Ponente	1895	681,240	6	6	1½	2 10-in., 10 6-in. Q.F., 6 4·7 in., 10 2·2 in., 10 1·4 in., 2 M.*	4	19·9 (*t*)	1000†	450
c.d.s.b.	Independencia .	S.	2336	230 0	44 4	13 0	2	3000	Birkenhead .	1891	176,600	8 (cp.)	8 (cp.)	2	2 9·4-in., 4 4·7-in. Q.F., 4 3-pr., 4 M.	2	14·4	340	225
c.d.s.b.	Libertad . . .	S.	2336	230 0	44 4	13 0	2	3000	Birkenhead .	1890	176,600								
a.c.	San Martino (ex Varese I.)	S.	6840	328 0	59 8	24 0	2	13,000	Leghorn	1896	664,600	6	6	1½	2 10-in., 10 6-in. Q.F., 6 4·7, 10 2·2, & 10 1·4 in. Q.F., 2 M.*	4	20·0	1000‡	450

* Armament of Garibaldi, San Martino, and Q.F. guns of Libertad and Independencia are Armstrong.

† Bunker capacity, in addition to liquid fuel.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
g.v.	Argentina	S.	820	192 0	27 0	13 0	1	850	Trieste	1883	25,500	..	..	1 6-in., 6 7-c.m. Krupp, 4 M.	..	12·0	220	120
cr.	Buenos Aires	S. shd.	4780	396 0	47 2	19 0	2	17,000	Elswick	1895	383,000	4½	1–5	2 8-in. Q.F. (Armstrong), 4 6-in. Q.F., 6 4·7-in. Q.F., 16 3-pr., 6 1-pr.	5	23·2*	1000†	429
to.g.b.	Espora	S.	520	210 0	25 0	8 0	2	3500	Birkenhead	1890	..	..	..	3 3-in. Q.F., 4 3-pr., 2 M.	5	20·0	100	124
cr.	Nueve de Julio	S.	3570	354 0	44 0	19 6	2	14,350	Elswick	1892	293,000	4½	4½	4 6-in. Q.F. (Armstrong), 8 4·7-in., 12 3-pr., 12 1-pr.	5	22·74	770†	300
cr.	Patagonia	S. & W.	1442	220 0	32 10	12 9	2	2400	Trieste	1885	100,000	..	1½	1 10-in., 3 6-in., 6 l., 10 M.	..	13·0	350	210
to.g.b.	Patria	S.	1070	250 0	31 0	10 0	2	4500	Birkenhead	1893	87,000	..	..	2 4·7-in. Q.F., 4 8-pr., 2 3-pr., 2 M.	5	20·75	288	159
g.v.	Paraná	I.	550	142 8	25 0	11 9	1	475	Birkenhead	1874	..	..	..	2 6-in., 2 4·7-in.	..	11·0	..	..
cr.	25 de Mayo	S.	3200	325 0	43 0	16 0	2	13,800	Elswick	1890	260,000	4½	4½	2 8·2-in. (Armstrong), 8 4·7-in. Q.F., 12 3-pr., 12 1-pr.	6	22·43	600†	185
g.v.	Uruguay	I.	550	142 8	25 0	11 9	1	475	Birkenhead	1874	..	..	..	2 6-in., 2 4·7-in.	..	11·0	..	..

Messrs. Laird are completing a training-ship (cruiser), Presidente Sarmiento, 2750 tons, 2000 I.H.P., and 13 knots speed, with nineteen guns and three torpedo-tubes; launched 1897. There are several other small gunboats; also the torpedo-ram Maipù (1063 tons, 1750 I.H.P.), built in England in 1880.

* Natural draught. † Bunker capacity.

AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.					£	inches.	inches.	inches.			knots.	tons.	
c.d.s.	Budapest . .	S.	5550	305	0	55	9	21	0	2	9185 (t)	Trieste .	1896	339,062	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9-in. Q.F., 14 47-m.m. Q.F., 2 M.	4	17·8	500	..
c.b.	Custoza . . .	I.	7060	302	3	58	0	24	6	1	4440	Trieste .	1872	414,400	9	7	1½	8 10·2-in. (Krupp), 11 Q.F., 8 l.	2	(t) 14·0	584	567
a.c.	"D". . . .	S.	6100	367	6	56	0	20	4		12,000	Trieste .	Bldg.	368,124	10·6 H.S.	9·8 H.S.	1½ H.S.	2 9·4-in., 8 5·9-in. Q.F., 18 smaller.	4	20·0	800	450
c.b.	Don Juan de Austria	I.	3550	240	3	50	0	20	0	1	2700	Trieste .	1875	..	8	6	1	8 8·2-in. (Krupp), 11 Q.F. & M., 6 l.	4	13·0	380	440
c.d.s.	Erzherzog Albrecht.	I.	5940	285	2	56	3	22	0	1	3600	Trieste. .	1872	357,600	9	7	1½	8 9·4-in. (Krupp), 11 Q.F., 8 l.	2	13·0	453	535
c.b.	Kaiser . . .	W.	5810	254	0	58	3	24	3	1	3200	Pola . .	1871	337,200	6	5½		10 9-in. (Armstrong) M.L.R., 11 Q.F. & M., l.	..	13·0	450	540
a.c.	Kaiserin Maria Theresia	S.	5270	351	0	52	6	21	4	2	9755	Trieste .	1893	304,187	4	4	2	2 9·4-in., 8 5·9-in. Q.F., 18 1·8 Q.F., 2 2·7-in., 2 M.	4	19·0	740	450
c.b.	Kaiser Max . .	I.	3566	240	3	50	0	20	0	1	2700	Trieste .	1875	211,600	8	6	1	8 8·2-in. (Krupp), 11 Q.F. & M., 6 l.	4	13·0	380	440
Riv. Mon.	Körös . . .	S.	448	177	0	29	6	4	0	2	1250	Buda Pesth	1892	..	2	3	¾	2 4·7-in. Q.F., 2 l., 1 M. .		10·0	..	..
b.	Kronprinz Rudolph	S.	6940	295	0	62	4	25	3	2	7500	Pola . .	1887	330,000	12	10	2½	3 12-in. (Krupp), 6 4·7-in. Q.F., 11 smaller & M., 2 l.	4	16·0	600	492
b.	Kronprinzessin Stephanie	S.	5150	278	10	55	9	21	6	2	8300	Trieste .	1887	300,000	9	8	1	2 12-in. (Krupp), 6 5·9-in., 11 Q.F. & M., 2 l.	4	17·0	400	510
Riv. Mon. "	Leitha . . Maros . .	I. & S.	310	166	0	27	6	3	7	2	320	Buda Pesth	1871	20,000	1·7	2	1	1 4 7-in. Q.F., 2 M. . .	..	8·0	20	54
c.d.s.	Monarch . .	S.	5550	305	0	55	9	21	0	2	8900 (t)	Pola . .	1895	339,062	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9-in. Q.F., 14 47-m.m. Q.F., 2 M.	4	17·4	500	..
c.b.	Prinz Eugen . .	I.	3566	240	6	50	0	20	0	1	2700	Pola . .	1877	..	8	6	1	8 8·2-in (Krupp), 11 Q.F. & M., 6 l.	4	(t) 13·0	380	440
Riv. Mon.	Szamos . . .	S.	448	177	0	29	6	4	0	2	1250	Buda Pesth	1892	..	2	3	¾	2 4·7-in. Q.F., 2 Q.F., 1 M. .	..	10·0		
c.b.	Tegetthoff . .	I. & S.	7390	286	11	71	1	24	10	2	8800	Trieste .	1878 R. 1893	..	14	14	3	6 9·4-in. (Krupp), 5 5·9-in. Q.F., 15 smaller do., 2 M.	4	16·3	670	578
c.d.s.	Wien . . .	S.	5550	305	0	55	9	21	0	2	8480 (t)	Trieste .	1895	339,062	10·6 H.S.	10·6 H.S.	2½ H.S.	4 9·4-in., 6 5·9 Q.F., 14 47-m.m. Q.F., 2 M.	4	17·6	500	..
c.d.s.	Unnamed . . .	S.	7800	..		..		..		..	..	..	Pro.	..	..	..	..	..	..	(t) 18·5	..	..

AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			met. tns.	ft. in.	ft. in.	ft. in.					£	in.	in.			knots.	tons.	
corv.	Aurora	C.	1370	190 6	32 10	16 1	1	1000	Trieste	1873	..	..	..	2 4·7-in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11·0	160	200
to. cr.	"B."	S.	2400	301 10	39 6	14 2	2	5000	Pola	Bldg.	..	..	..	8 4·7-in. Q.F., 12 1·8-in.	1	20·0	..	..
to. g. b.	Blitz	S.	360	193 6	22 4	8 0		3500	Elbing	1888	..	..	..	9 Q.F.	..	21·0	250	61
cr. 3rd cl.	Donau	C.	2344	230 0	42 8	19 8	1	1800	Pola	1893	..	..	..	10 4·7-in. (Uchatius), 4 M., 1 l.	..	12·0	320	..
cr. 3rd cl.	Erzherzog Friedrich	W.	1590	173 10	39 5	16 9	1	800	Venice	1874	..	..	..	10 5·9-in. (Wahrendorf), 1 l.	..	9·0	200	261
cr. 3rd cl.	Fasana	C.	2000	223 3	39 5	16 9	1	1700	Trieste	1870	..	..	..	4 5·9-in. (Krupp), 2 Q.F., 1 l.	..	12·0	315	260
cr.	Frundsberg	C.	1370	190 6	32 10	16 1	1	1000	Trieste	1873	..	..	..	2 5·9-in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11·0	160	209
cr. 2nd cl.	Kaiserin Elizabeth	S.	4064	321 6	47 6	18 7	2	9000	Pola	1890	..	3·5	2¼	2 9·4-in. (Krupp), 6 5·9-in. do., 11 Q.F., 2 l.	5	19·0	660	450
cr. 2nd cl.	Kaiser Franz Joseph I.	S.	4030	321 6	47 6	18 7	2	9000	Trieste	1889	..	3·5	2¼	2 9·4-in. (Krupp), 6 5·9-in. do., 11 Q.F., 2 l.	5	19·0	660	450
to. g. b.	Komet	S.	360	193 6	22 4	8 0	..	3500	Elbing	1888	..	..	..	9 Q.F.	..	21·0	..	61
cr. 2nd cl.	Laudon	C.	3430	253 0	46 0	20 8	1	2600	Trieste	1873	..	..	..	15 5·9-in. (Krupp), 7 Q.F. & M., 2 l.	..	13·0	450	497
cr. 3rd cl.	Leopard	S.	1582	224 0	34 0	14 0	2	6000	Elswick	1886	200,000	..	..	2 4·7-in. Q.F., 10 Q.F. & M.	4	18·3	250	148
to. g. b.	Lussin	S.	1011	200 4	26 3	12 2	2	1830	Trieste	1883	..	..	1½	2 5·9-in. (Krupp), 7 M., 1 l.	..	14·0	200	142
to. g. b.	Magnet	S.	510	219 10	26 10	8 0	2	6000	Elbing	1896	51,052	..	..	6 1-8-in. Q.F.	3	26·0*t*	105	..
to. g. b.	Meteor	S.	350	187 0	22 4	8 0	2	3500	Elbing	1887	..	..	..	9 Q.F.	1	23.1	120	61
cr. 3rd cl.	Panther	S.	1582	224 0	34 0	14 0	2	6000	Elswick	1885	..	..	..	2 4·7-in. Q.F., 10 Q.F. & M.	4	18·5	250	148
to. deps.	Pelican	S.	2470	279 0	39 4	15 6	.	4600	Elbing	1891	..	..	..	2 5·9-in. (Krupp), 8 Q.F.	4	18·0	..	..
to. g. b.	Planet	S.	500	210 0	23 0	8 3	2	2500	Jarrow	1889	..	..	..	10 Q.F.	1	19·6	..	61
cr. 2nd cl.	Radetzky (Gunnery Ship)	C.	3450	253 0	46 0	20 8	1	2700	Trieste	1872	..	..	..	15 5·9-in. (Krupp), 7 Q.F. & M., 2 l.	..	14·0	450	497
cr. 3rd cl.	Saida	C.	2500	233 4	42 8	19 1	1	1800	Pola	1878	..	..		11 5·9-in. (Uchatius), 1 l.	..	12·0	320	299
to. g. b.	Satellit	S.	540	220 6	26 9	9 2	2	4000	..	1893	..	..	1½	9 Q.F.	..	21·87	..	61
to. g. b.	Sebenico	S.	900	187 0	26 3	12 2	2	1380	Pola	1882	..	..	..	7 Q.F., 5 l.	..	14·0	200	142
cr. 3rd cl.	Spalato	S.	850	179 6	26 3	12 2	2	1200	Trieste	1879	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	Tiger	S.	1684	233 0	32 10	15 5	2	5260	Trieste	1887	..	..	..	4 4·7-in. 10 Q.F.	..	18·0	300	190
to. g. b.	Trabant	S.	530	210 0	23 0	8 3	2	3500	Trieste	1890	..	..	..	10 Q.F.	1	20·0	..	61
to. v.	Zara (Torpedo Ship)	S.	850	179 6	26 3	12 2	2	1200	Pola	1879	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	Zenta	S.	2300	312 0	39 6	14 2	2	5000	Pola	1897	..	..	..	8 4·7 Q.F., 12 1·8-in., 2 M.	1	20·0	..	..
corv.	Zrinyi	C.	1370	190 6	32 10	16 1	1	1000	Trieste	1871	..	..	..	2 5·9-in. (Wahrendorf), 5 l., 2 M. or Q.F.	..	11·0	160	209

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.

BRAZIL.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Backing. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	inches.			knots.	tons.	
t. River	Alagoãs	W.	340	120 0	28 0	4 10	2	180	Brazil	1886	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth), 2 M.	..	7·0	..	43
c.d.s., t.	Bahia	I.	1000	178 0	35 0	8 6	2	1640	Birkenhead	1865	..	4½	5½	10⅝	2 7-in. M.L.R. (Whitworth), 2 M.	..	6·0	..	125
t. River	Maranhao	S.	470	137 0	34 7	6 5	2	700	Brazil	Bldg.	..	5 H.S.	..	..	2 4·7-in. Q.F.	..	12·0	..	..
c.d s., t.	Marshal Deodoro	S.	3162	267 6	48 0	13 2	2	3400	La Seyne	Bldg.	..	13¾ H.S.	7¾-8¾ H.S.	1½	2 9·4-in., 2 5·9-in. howitzers, 4 4·7-in. Q.F., 2 M., 4 6-pr. and 2 1-pr.	2 (sub.)	15·0	236	200
c.d.s., t.	Marshal Floriano																		
t. River	Pernambuco	S.	470	137 0	34 7	6 5	2	700	Brazil	Bldg.	..	5 H.S.	..	..	2 4·7-in. Q.F.	..	12·0	..	..
t. River	Piauhy	W.	340	120 0	28 0	4 10	2	180	Brazil	1887	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth)	..	7·0	..	43
t.	Riachuelo	S. shd.	5700	305 0	52 0	19 6	2	7300	Poplar	1883 R. 1895	365,000*	11 comp.	11 & 10 comp.	10 2″	4 9·2-in. (Whitworth, altered by Armstrong), 6 4·7-in., Q.F., 2 3-pr., 15 M.	5	16·71	800	450
t. River	Rio Grande	W.	340	120 0	28 0	4 10	2	180	Brazil	1888	..	4½	4½	14½	1 7-in. M.L.R. (Whitworth)	..	7·0	..	43
t.	24 de Maio (ex Aquidaban)	S shd.	4950	280 0	52 0	18 0	2	6200	Poplar	1885 R. 1897	345,000*	11	11½ & 10 cp.	10 2″	4 9·4-in. (Canet), 4 5·5-in., 2 Q.F., 13 M.	5	15·0	600	350

* Exclusive of guns and ammunition. The ship is undergoing reconstruction at Elswick.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.†	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.			knots.	tons.	
cr.	**Almirante Tamandare**	S. shd.	4735	294 0	46 0	18 4	2	7500	Brazil	1890	..	..	1½	10 6-in. Q.F., 2 4·7-in., 8 M.	8	17·0	750	450
„	**Andrada** (ex **America**)	S. shd.	2600	252 8	34 0	18 0	1	3600	..	1890	..	..	..	2 4·7-in. 2 14-pr. Q.F., 6 6-pr., 6 1-pr.	5	17·0	..	..
„	**Barroso**	S. shd.	3600	330 0	43 9	16 10	2	7500	Elswick	1896	..	4½	3	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M.	3	20·0	700	..
„	**Benjamin Constant**	S. shd.	2750	236 0	46 0	18 0	1	2800	La Seyne	1892	..	..	2	4 6-in. Q.F., 8 4·7-in., 8 M., 4 l..	4	14·0	260	287
to.cr.	**Caramuru**	S.	1030	249 6	30 9	10 2	2	6000	Kiel	1896	..	..	½	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in.	3	22·5	..	..
to.g.b.	**Gustavo Sampaio**	S.W.	500	197 0	21 0	7 9	2	2500	..	1893	..	..	..	2 20-pr. Q.F., 4 7-pr. Q.F.	3	18·0	150	95
..	**Nictheroy** (ex **El Cid**)	C.	7080	400 0	48 0	22 0	..	4,000*	New York	1893	..	..	..	1 4·7-in. Q.F., 2 3·9-in., 8 6-pr., 10 3-pr.	3	19 0	..	..
„	**Parnahyba** (Torpedo training.)	C.	838	170 6	26 3	11 2	1	900	Havre	1878	..	..	..	5 4·7-in., 4 M.	..	10·0	..	..
„	**Paysandu** (ex **Guanabára**)	W.	1900	200 0	41 2	16 4	1	3000	Brazil	1877	..	..	..	9 70-pr. M.L.R. (Whitworth), 6 M., 2 l.	..	13·0	..	250
cr.	**Primeiro de Março**	C.	726	167 3	26 3	10 6	1	750	Brazil	1881	..	..	..	7 4·5-in. M.L.R. (Whitworth), 4 M.	..	9·0	..	..
„	**Quinze de Novembro** (ex **Republica**)	S.	1300	210 0	35 0	13 0	2	3300	Elswick	1892	..	..	2–1	6 4·7-in. Q.F., 4 6-pr., 6 M.	4	17·0	170	160
to.cr.	**Tamoyo**	S.	1038	269 0	28 10	9 10	2	7000	Kiel	Bldg.	..	..	..	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	23·0	100	110
„	**Timbira**	S.	1030	249 6	30 9	10 2	2	7000	Kiel	1896	..	..	½	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	100	..
g.v.	**Tiradentes**	S. shd.	800	165 0	30 0	11 0	2	1200	Elswick	1892	..	..	..	4 4·7-in. Q.F., 3 6-pr., 4 M.	2	14·5	110	107
cr.	**Tonelero** (ex **Trajano**)	W.	1414	200 0	30 0	15 6	2	2400	Brazil	1873 / 1895	..	..	..	7 4·7-in. Q.F., 4 M..	..	13·0	..	..
„	**Trinidade** (ex **Liberdade**)	I.	250	101 8	21 8	10 10	2	280	Brazil	1884	..	..	..	2 l., 1 M.	..	10·0	..	..
to.cr.	**Tupy**	S.	1030	249 6	30 9	10 2	2	7000	Kiel	1896	..	..	½	2 3·9-in. Q.F., 6 2·2-in., 2 1·4-in., 2 M.	3	22·5	100	..

* Doubtful.

† All the Q.F. guns above 6-pr. in Brazilian Navy are Armstrong.

CHILI.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.b.	Almirante Cochrane	I.	3500	210 0	45 9	19 8	2	2920	Hull .	1874	..	9	8	3″	6 8-in. (Armstrong), 4 6-pr. Q.F., 4 3-pr., 7 M.	3	13·0	500	242
a.c.	Almirante O'Higgins	S. shd.	8500	411 9	62 6	..	2	16,000	Elswick .	1897	..	7	6	2	4 8-in. Q.F., 10 6-in., 4 4·7-in , 10 12-pr., 10 6-pr., 4 M.	3 (2 sub)	22·0	..	..
b.	Capitan Prat . .	S. shd.	6900	328 0	60 8	21 10	2	12,000	La Seyne .	1890	391,000	12 steel Schn.	10½ 4	3″	6 9·4-in. (Canet), 8 4·7-in. Q.F. (Canet), 6 2·2-in., 4 1·8-in., 10 1·4-in., 5 M.	4	18·3	400 1100	485
a.c.	Esmeralda . .	S. shd.	7020	436 0	53 2	22 3	2	18,000	Elswick .	1896	..	6 H.S.		2	2 8-in. Q.F., 16 6-in., 8 12-pr., 2 3-pr., 4 M.	3 (2 sub)	23·0	550* 1350	..
t.	Huascar . . .	I.	1800	200 0	35 0	15 6	1	1050	Birkenhead .	1865	..	4½	5½ t	1½″	2 8-in. (Armstrong), 2 4·7-in. Q.F., 3 M., 4 l.	..	12·0	250	134

* Bunker capacity.

Cruising Ships, &c.

Class.	NAME	Material of Hull.	Displacement.	Length.	Beam.	Maximum Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.			knots.	tons.	
to.g.b / to.g.b.	Almirante Condell / Almirante Lynch	S	750	240 0	27 6	10 6	2	4500	Birkenhead .	1890	..	..	..	3 14-pr. Q.F., 4 3-pr., 2 M. . .	5	21·0	100	..
to.g.b	Almirante Molinas	S.	1200	295 3	32 6	12 10	2	6000	..	Pro.	..	..	..	4 4·7 Q.F., 6 1·8-in., 4 1·4-in., 2 M. .	4	22·0	200	..
,,	Almirante Simpson	S.	812	240 0	27 6	10 6	2	4500	Birkenhead .	1896	..	4½	..	2 4·7 Q.F., 4 3-pr.	3	21·5t	100	..
cr.	Blanco Encalada .	S.	4400	370 0	46 6	18 6	2	14,500	Elswick .	1893	..		4–1¾	2 8-in., 10 6-in. Q.F., 12 3-pr., 10 1-pr.*	5	22·78	†900	..
gv.	Magellanes . .	C.	800	190 0	28 0	14 9	2	1230	London .	1874	..	..	..	2 6-in., 1 7-in. M.L.R., 6 M., 2 l. . .	..	11·0	300	100
cr.	Ministro Zenteno .	S.	3600	330 3	43 9	16 10	2	..	Elswick .	1896	..	..	..	8 6-in. Q.F., 10 6-pr., 4 1-pr.* .	3	20·0	..	..
gv.	Pilcomayo . .	W.	790	171 0	27 4	..	1	180 (nom.)	Birkenhead .	1874	..	..	..	2 70-pr. B.L.R. (Armstrong), 2 40-pr., 3 M.	..	9·0	125	125
cr. / ,,	Presidente Errázuriz / Presidente Pinto .	S. shd.	2080	268 0	35 9	19 6	2	5400	La Seyne .	1890	..	..	3½	4 6-in. Q.F. (Canet), 2 5-in., 4 2·2-in., 6 M.	3	19·0	200	171

Five Gunboats of 420 tons displacement and 7 to 10 knots speed. * Armstrong. † Bunker capacity.

CHINA.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches			knots.	tons.	
cr.	Foo-Ching	S.	2500	253 0	36 2	18 0	2	2400	..	1893	..	4½	4–2	3 5-in. Krupp, 4 M., 2 l.	..	16·0	..	..
to g.b.	Fei-Ying	S.	850	257 2	28 6	12 6	2	2400	Stettin.	1890	..	2	..	1 9-in. Krupp Q.-F., 2 4-in., 4 1·4-in. Hotchkiss	..	21·0	75	90
cr.	Hai-Chi.	S.	4300	396 0	46 8	18 6	2	..	Elswick.	1898	..	6	5	2 8-in. Q.F., 10 4·7-in., 12 3-pd.	5	24·0	100*	..
,,	Hai-Shen																	
,,	Hai-Shew	S.	2950	314 8	41 0	16 0	2	8000	Vulcan, Stettin.	1897	..	2	3	3 6-in. Q.-F., 8 4-in., 6 1·4-in. Hotchkiss, 6 M.	3	19·5	220	244
,,	Hai-Yung																	
,,	Hai-Tien	S.	4300	396 0	46 8	18 6	2	..	Walker.	1897	..	6	5	2 8-in. Q.-F., 10 4·7-in., 12 3-pd.	5	24·0	100	..
,,	Hi-Ying	S.	2200	253 0	36 2	18 1	2	2400	..	1895	..	..	..	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1	21·0	..	..
,,	Huan-Tái	C.	2110	260 0	36 0	20 0	1	1600	..	1886	..	..	..	3 7-in. Krupp, 7 40-pr., 4 M.	2	15·0	360	..
,,	Kai-Chih	C.	2110	260 0	36 0	20 0	1	1600	..	1882	..	..	..	2 8·2-in., 6 5·9-in., 6 M., 5 l.	..	15·0	360	..
,,	King-Ching	C.	2100	250 0	36 0	20 0	1	2400	..	1886	..	..	..	3 7-in. Krupp, 7 40-pr., 6 M.	2	14·5	360	..
,,	Kwang-Ting	C.	1000	235 0	27 6	11 4	2	3400	..	1890	..	..	1	3 4·7-in. Q.F., 4 M., 2 l.	4	16·5	..	..
,,	Nan-Schuin	S.	2200	253 0	36 2	18 1	2	2400	Kiel.	1884	..	..	..	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1	14·5	600	..
,,	Nan-Thin	S.	2200	253 0	36 2	18 1	1	2400	Kiel.	1883	..	..	.	2 8-in. Armstrong, 8 4·7-in. Q.F., 4 M.	1	15·0	600	..
..	Pao-Min	S.	1480	213 0	36 0	14 0	1	2400	..	1883	..	..	..	2 6-in. Armstrong, 6 5-in., 2 l.	..	9	300	..
g.b.	Tien-Sing	W.	200	105 0	20 4	7 0	2	340	..	1875	..	3	..	1 7-in. (Krupp)	..	10·0	..	..

The displacement of German-built ships in metric tons. An 1800-ton cruiser was launched at Foochow in 1896. * Coal Capacity.

DENMARK.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.d.s., t.	Gorm	I.	2344	231	0	40	0	14	0	2	1670	Copenhagen	1870	104,000	7	8	..	2 10-in. (Armstrong) M.L.R., 3 3·4-in. (Krupp), 4 M.	..	12·25	115	158
t.	Helgoland	I.	5347	257	6	59	2	18	8	2	4000	Copenhagen	1878	275,000	12	10	4	1 12-in. (Krupp), 4 10·2-in., 5 4·7-in., 10 M.	4	12·0	230	350
c.d.s, t.	Herluf Tralle	S.	5000	..		..		..		2	..	Copenhagen	Bldg.	..	..	..	..	..	..	..	..	..
b.	Iver Hvitfeldt	S.	3260	242	0	49	6	18	0	2	5100	Copenhagen	1886	200,000	12	8	2	2 10·2-in. (Krupp), 4 4·7-in., 12 M.	4	15·6	250	298
c.d.s., t / c.d.s., t.	Lindormen / Unnamed	I.	2076	216	0	39	5	13	9	2	1560	Copenhagen	1868 / Pro.	93,000	5	5	..	2 9-in. (Armstrong) M.L.R., 3 3·4-in. (Krupp), 4 M.	..	12·0	120	140
c.b.	Odin	I.	3083	237	0	50	0	15	6	1	2260	Copenhagen	1872	147,000	8	8	..	4 10-in. (Armstrong) M.L.R., 4 3·4-in. (Krupp), 7 M.	..	12·4	180	236
t.	Skjold	S.	2150	226	6	38	0	13	5	2	2200	Copenhagen	1896	..	9	8-4½	2	1 9·4-in., 3 4·7-in. (Krupp), 4 1·8-in. Q.F., 1 M.	4	13·0	..	..
T. S.	Tordenskiold	S.	2400	221	6	43	3	15	6	2	2600	Copenhagen	1880	138,900	..	8	4-2	1 14-in. (Krupp), 4 4·7-in., 8 M.	4	14·0	170	220

Esbern Snare (torpedo school-ship), 530 tons, 2-in. belt. Repaired 1895–6.

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
g. v.	Absalon	I.	527	150	0	26	0	10	2	1	500	Blackwall	1862	..	2½	2½	4 3·4-in. (Krupp), 4 M.	..	10·0	65	70
"	Diana	W.	556	154	6	26	3	10	2	1	500	Copenhagen	1863	33,000	..	..	6 3·4-in. (Krupp), 2 M.	..	9·0	60	81
"	Falster	I.	356	111	0	28	10	7	6	2	510	Copenhagen	1873	33,000	..	..	1 10-in. (Armstrong) M.L.R., 2 3·4-in. (Krupp), 2 M.	..	9·8	20	35
cr.	Fyen	S. shd.	2596	226	6	45	6	18	1	1	2700	Copenhagen	1882	170,000	..	1½	18 5·9-in. (Krupp), 8 M.	2	13·0	290	407
3rd cl. cr.	Geiser	S.	1280	257	6	27	6	11	4	2	3000	Copenhagen	1892	..	..	1½	2 4·7-in. Q.F., 4 3·4-in., 6 M.	4	17·1	..	..
"	Heimdal	S.	1280	257	6	27	6	11	4	2	3000	Copenhagen	1894	..	..	1½	2 4·7-in. Q.F., 4 3-pr., 6 M.	4	17·5	..	..
"	Hekla	S.	1280	233	0	32	10	11	2	2	3000	Copenhagen	1890	..	..	1½	2 6-in. Q.F., 4 2·2-in., 6 M.	4	17·0	..	..
g. v.	Ingolf	I.	870	192	0	28	0	12	6	1	600	Copenhagen	1876	44,000	..	..	2 5·9-in. (Krupp), 4 3·4-in., 2 M.	..	10·5	130	117
g. v.	Möen	I.	356	111	0	28	10	7	6	1	523	Copenhagen	1875	..	..	..	1 10-in. (Armstrong) M.L.R., 2 3·4-in. (Krupp), 2 M.	..	9·2	20	35
corv.	Saint Thomas	W.	1572	224	0	33	0	17	0	1	1870	Copenhagen	1871	..	..	..	8 4·7-in. (Krupp), 6 M.	..	13·0	190	182
cr.	Valkyrien	S.	2900	268	0	43	6	18	0	2	5300	Copenhagen	1887 1896	..	..	2½	2 8·2-in. (Krupp), 6 5·9-in., 4 Q.F., 10 M.	5	17 0	450	300

Gunboats.—Five in number (*Lille Belt, Öresund, Store Belt, Grönsund, Guldborgsund*), of 150 to 240 tons. 200 to 400 I.HP. *Dagmar* (training-ship), corvette, 1200 tons; *Hjaelperen* (mining), 280 tons; *Sleipnir* (ice-breaker), 1260 tons, 3000 I.H.P.

FRANCE.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
a.g.b.	**Achéron**	I. & S.	1721	181	0	40	4	11	10	2	1700	Cherbourg	1885	100,000	8	8	2½	1 10·8-in., 3 3·9-in. Q.F., 2 1·8-in., 4 M.	..	13·0	100	101
b.	**Amiral Baudin**	I. & S.	11,911	321	6	69	10	26	2	2	8320	Brest	1883	600,000	21½	16½	4	2 14·6-in., 8 6·4-in. Q.F., 8 5·5-in., 16 1·8-in., 6 1·4-in.*	4	15·0	800	630
a.c.t.	**Amiral Charner**	S.	4792	348	0	46	0	19	2	2	8300	Rochefort	1893	353,200	3½	2	2	2 7·6-in., 2 5·5-in. Q.F., 4 2·5-in., 6 1·8-in., 6 1·4-in., M.	5	18·2	413	375
b.	**Amiral Duperré**	I. & S.	11,209	311	0	66	11	26	9	2	8120	La Seyne	1879	570,000	21½	15½	2¼	4 13·3-in., 1 6·4-in., 14 5·5-in., 11 Q.F., 18 M.	4	14·22	850	664
a.c.t.	**Amiral Pothuau**	S.	5360	370	6	50	2	21	0	2	10,398 *t*	Havre	1895	384,000	3½–2	9½	3⅜	2 7·6-in., 10 5·5-in. Q.F., 16 1·8-in., 8 1·4-in.	5	19·2*t*	538	461
t.	**Amiral Tréhouart**	S.	6629	293	2	58	4	23	2	2	8500	Lorient	1893	593,100	17¾	14½	4	2 12-in., 8 3·9-in. Q.F., 4 1·8-in. Q.F., 4 1·4-in., 8 M.	2	15·76 *t*	300	337
a.c.	**Bayard**	W. & I.	6011	265	9	57	2	24	11	2	4538	Brest	1880	..	10	8	2	4 9·4-in., 2 7·6 in., 6 5·5-in., 2 2·5-in., 12 M.	2	14·0	500	450
t.	**Bouvet**	S.	12,200	401	2	70	3	27	6	3	14,000	Lorient	1896	1,100,770	15¾–8 N.S.	14½ N.S.	3½ N.S.	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 8 3·9-in., 12 1·8-in., 20 1·4-in.	4	17·5	621	631
t.	**Bouvines**	S.	6610	293	9	58	3	23	3	2	8400	La Seyne	1892	594,640	17¾	14½	4	2 12-in., 8 3·9-in. Q.F., 4 1·8-in., 10 1·4-in. M.	2	16·05	300	323
t.	**Brennus**	S.	11,395	361	0	67	0	26	3	2	14,000	Lorient	1891	991,767	15¾ comp.	15¾	4¾	3 13·4-in., 10 6·4-in. Q.F., 4 2·5-in., 8 1·8-in., 8 M.	4	17·1	800	696
a.c.t.	**Bruix**	S.	4754	365	3	46	0	19	10	2	9049*t*	Rochefort	1894	409,622	3¾	3¾	2	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 4 1·8-in., 6 1·4-in., M.	4	18·3*t*	406	391
b.	**Caïman**	I. & S.	7639	278	3	59	0	24	7	2	6000	Toulon	1885	..	19½	17¾	3	2 16·5-in., 4 3·9-in. Q.F., 2 1·8-in., 16 M.	4	14·5	400	332
t.	**Carnot**	S.	12,008	382	2	70	6	27	3	2	16,300 *t*	Toulon	1894	1,070,088	17¾ 10¾	14½	2¾	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 16 1·8-in., 10 1·4-in.	4 (2 sub.)	17·86 *t*	705	625
a.c.t.	**Chanzy**	S.	4933	348	0	46	0	19	2	2	8300	Bordeaux	1894	360,000	3¾	2	2	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 6 1·8-in., 6 1·4-in., M.	4	19·0	413	375
t.	**Charlemagne**	S.	11,275	385	6	66	6	27	6	3	14,500	Brest	1895	1,096,432	15.7	15¾	3½	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1.4-in., 8 M.	4	18·0	680‡	631
t.	**Charles Martel**	S.	11,880	392	6	71	0	27	6	2	14,996 *t*	Brest	1893	1,092,830	17¾	15¾	3½	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 14 1·8-in., 5 1·4-in.	6	18·1*t*	677	632
a.g.b.	**Cocyte**	I. & S.	1714	181	10	40	4	11	10	2	1700	Cherbourg	1887	100,000	8	8	2½	1 10·8-in., 2 3·9-in. Q.F., 2 1·8-in., 4 M.	..	13·0	100	101
c.b.	**Colbert**	W.	8924	317	9	56	6	28	5	1	4652	Brest	1875	..	8½	6¼	..	8 10·8-in., 2 9·4-in., 6 5·5-in., 2 Q.F., 14 M.	4	14 47	700	706
c.b. & b.	**Courbet**	I. & S.	10,808	312	0	67	0	25	0	2	8100	Toulon	1881	800,000	15	9½	2½	4 10·8-in., 4 9·4-in., 6 5·5-in., 2 Q.F., 18 M.*	5	15·4	1000	669
a.c.	**Desaix**	S. shd.	7700	426	6	58	4	24	4	3	17,100	Private yard	Bldg.	620,000	..	..	..	10 6·4-in. Q.F., 10 1·8-in., 6 1·4-in.	2	21·0	880	531
c.b. & b.	**Dévastation**	I. & S.	10,704	312	0	67	0	25	0	2	8320	Lorient	1879	..	15	9½	2½	4 10·8-in., 4 9·4-in., 6 5·5-in., 2 Q.F., 18 M.*	4	15·17	950	685
a.c.b.	**Duguesclin**	I. shd.	6210	266	0	57	0	25	3	2	3300	Rochefort	1883	220,000	9	8 comp.	2	4 9·4-in., 1 7·6-in., 6 5·5-in., 1 3·5-in. Q.F., 10 M.	2	14·0	400	430
a.c.	**Dupetit Thouars**	S.	9517	452	9	63	8	24	7	3	19,600	Toulon	Bldg.	804,600	6	..	..	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	(2 sub.)	21·0	§ 1020	612
,,	**Dupleix**	S. shd.	7700	426	6	58	4	24	4	3	17,100	Rochefort	Bldg.	620,000	..	..	..	10 6·4-in. Q.F., 10 1·8-in., 6 1·4-in.	2	21·0	880	531
,,	**Dupuy de Lôme**	S.	6406	374	0	51	6	23	6	3	14,000	Brest	1890	416,000	4	4	2	2 7·6-in., 6 6·4-in. Q.F., 12 2·5-in., 1·8-in., 8 M.	4	20·0	900	515
a.g.b.	**Flamme**	S.	1128	165	0	32	7	10	4	2	1500	Cherbourg	1885	68,000	10	4-in.	2	1 9·4-in., 1 3·5-in., 4 M.	1	13·0	120	84
b.	**Formidable †**	S.	12,165	321	6	69	6	26	2	2	9700	Lorient	1885	467,520	21½	17¾	3	2 14·6-in., 8 6·4-in. Q.F., 8 5·5-in., 9 1·8-in., 14 M.*	6	16·0	900	640

* New armament.

* New armament. † Has received new boilers. ‡ Also liquid fuel. § Including liquid fuel.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
c.b. & b.	Friedland	I.	8994	317 0	58 0	29 11	1	4428	Lorient	1873	..	8	7	..	8 10·8-in., 8 5·5-in., 20 M.	4	13·3	800	676
c.d.s., t.	Fulminant	I. & S.	5965	248 0	57 9	21 4	1	4500	Cherbourg	1877	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	13·8	400	248
c.d.s., b.	Furieux	I. & S.	6019	247 10	59 0	21 9	2	5033	Cherbourg	1883	264,640	20	17¾	3½	2 9·4-in., 5 Q.F., 10 M.	2	14·0	290	248
a.g.b.	Fusée	S. shd.	1142	165 0	32 7	10 4	2	1500	Lorient	1884	68,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M.	1	13·0	120	84
t.	Gaulois	S.	11,275	385 6	66 6	27 6	3	14,500	Brest	1896	1,093,925	15¾	15¾	3½–1½	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	6	18·0	680‡	632
a.g.b.	Grenade	S. shd.	1089	165 0	32 7	10 4	2	1500	Lorient	1888	68,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M.	1	13·0	120	84
a.c.	Gueydon	S.	9517	452 9	63 8	24 7	3	20,200	Lorient	Bldg.	..	6	..	..	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 (sub.)	21·0	‡‡ 1020	612
c.d.s., t.	Henri IV.	S.	8948	354 3	72 10	23 0	3	11,500	Cherbourg	Bldg.	800,000	(?)	(?)	(?)	2 10·8-in., 7 5·5-in. Q.F., 12 1·8-in. Q.F., 2 M.	2 (sub.)	17	725	(?)
t. & b.	Hoche	I.&S.	10,997	333 0	65 7	27 3	2	11,300	Lorient	1886	700,000	18	16	3	2 13·4-in., 2 10·8-in., 8 5·5-in., Q.F., 8 Q.F., 12 M.	5	16·0	800	660
t.	Iéna	S.	12,052	400 9	68 2	27 6	3	15,500	Brest	Bldg.	1,136,385	..	..	..	4 12-in., 8 6·4-in. Q.F., 8 3·9-in., 16 1·8-in., 18 1·4-in.	4 (2 sub.)	18·0	820	631
t.	A 9*	S.	..	..	..	..	..	..	Brest	Pro.	..	..	..	..	.. ..	..	..	..	..
b.	Indomptable†	I.&S.	7634	279 10	59 0	23 6	2	6605	Lorient	1883	..	20	17½	3	2 16·5-in., 4 3·9-in. Q.F., 2 1·8-in., 16 M.	4	14·8	400	332
t.	Jauréguiberry	S.	11,824	364 0	72 10	27 9	2	15,800	La Seyne	1893	1,069,536	17¾	14½	2¾	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 4 2·5-in., 12 1·8-in., 8 1·4-in., 8 M.	6	18·07	700	625
[illegible]	Jeanne d'Arc	S.	11,270	469 2	63 8	26 7	3	28,000	Toulon	Bldg.	882,955	6–3 H.S.	(?)	2·2 H.S.	2 7·6-in., 8 5·5-in. Q.F., 12 3·9-in., 16 1·8-in., 8 1·4-in., 2 M.	2	23	1400	626
c.d.s., t.	Jemmapes	S.	6592	284 0	57 8	22 0	2	9250	St. Nazaire	1892	525,000	17¾–10	17¾	4–2¾	2 13·4-in., 4 3·9-in. Q.F., 4 1·8-in. Q.F., 10 1·4-in. M.	2	16·7	300	334
a.c.	Kléber	S. shd.	7700	426 6	58 4	24 4	3	17,100	Private yard	Bldg.	620,000	..	..	..	10 6·4-in. Q.F., 10 1·8-in., 6 1·4-in.	2	21·0	880	531
a.c.	Latouche-Tréville	S.	4756	348 0	46 0	19 2	2	8300	Havre	1892	360,000	3⅝	3¾	2–1½	2 7·6-in., 6 5·5-in. Q.F., 4 2·5-in., 4 1·8-in., 6 1·4-in. M.	4	18·2	406	375
b.	Magenta	I.&S.	10,851	330 0	65 7	27 3	2	12,000	Toulon	1890	760,960	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in., 12 1·8-in., 8 M.	3	16·25	800	660
b.	Marceau	I.&S.	10,850	330 0	65 7	27 3	2	12,000	La Seyne	1887	769,080	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in. and 12 1·8-in., 8 M.	6	16·4	800	660
t.	Masséna	S.	11,924	384 10	66 0	27 0	3	13,500	St. Nazaire	1895	1,100,400	17¾–9¾	15¼ 15¾ H. S.	3½ H. S.	2 12-in., 2 10·8-in., 8 5·5-in. Q.F., 8 3·9-in., 12 1·8-in. and 12 1·4-in.	6 (2 sub.)	17·5	630	642
a.g.b.	Mitraille	S. shd.	1128	165 0	32 7	10 4	2	1500	Rochefort	1886	70,000	10	4	2	1 9·4-in., 1 3·5-in., 4 M.	..	13·0	120	84
a.c.	Montcalm, C 4, C 7, C 8	S.	9517	452 9	63 8	24 7	3	20,000	La Seyne, Cherbourg, Lorient, Private yard	Pro.	..	6	..	..	2 7·6-in., 8 6·4-in. Q.F., 4 3·9-in., 16 1·8-in., 6 1·4-in.	2 sub.	21·0	‡‡ 1020	612
b.	Neptune	I. & S.	10,983	330 0	65 7	27 3	2	12,000	Brest	1887	780,000	18	16	3	4 13·4-in., 17 5·5-in. Q.F., 4 2·5-in. and 12 1·8-in., 8 M.	5	16·02	800	660
c.d.s.	Onondaga §	I.	2593	226 6	49 3	16 0	2	642	New York	1863	..	5½	11¾	1	4 9·4-in., 4 M.	..	6·5	200	100
a.g.b.	Phlégéton	I. & S.	1796	187 0	40 4	11 10	2	1700	Cherbourg	1890	142,000	9	8	2	1 10·8-in., 1 5·5-in. Q.F., 4 1·8-in., 4 M.	..	12·4	72	101
c.b. & b.	Redoutable	I. & S.	9437	318 2	64 8	25 6	2	6071	Lorient	1876 1894	..	14	9½	2½	8 9·4-in., 6 3·9-in. Q.F., 2 Q.F., 12 M.**	4	14·66	1000	700
b.	Requin	I. & S.	7822	279 10	59 0	24 7	2	6000	Bordeaux	1885	..	19½	17¾	3	2 13·4-in., 4 3·9-in. Q.F., 2 1·8-in., 16 M.††	4	15·0	400	332

* Iéna class. Plans to be prepared in 1898. ** New armament. † Is receiving new boilers and part new armament. †† New armament. The Terrible, Indomptable and Caïman are to receive the same. ‡ Also liquid fuel. § Repaired and refitted as central ship of coast defence service at St. Malo. ‡‡ Including liquid fuel.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Material.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
c.b. & b.	Richelieu	W.	9128	323 6	57 10	27 11	2	4240	Toulon	1873	..	8½	6¼	..	6 10·8-in., 5 9·4-in., 8 5·5-in. 18 M.	4	13·11	900	720
t.	Saint Louis	S.	11,275	385 6	66 6	27 6	3	14,500	Lorient	1896	1,080,997	15¾ H.S.	3–15¾ H.S.	3½ H.S.	4 12-in., 10 5·5-in. Q.F., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	4	18·0	680	631
a.g.b.	Styx	I. & S.	1796	187 0	40 4	11 10	2	1700	Cherbourg	1892	142,000	9	8	2	1 10·8-in., 1 5·5-in. Q.F., 4 1·8-in., 4 M.	..	13·0	72	101
c.b.& b.	Suffren	W.	7925	282 6	57 10	29 10	1	4288	Cherbourg	1870	..	8	6¼	..	4 10·8-in., 4 9·4-in., 6 5·5-in. 3-ton, 12 M.	4	14·3	700	675
c.d.s., t.	Tempête	I. & S.	4869	248 0	57 9	16 9	1	2193	Brest	1876	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	11·7	200	197
b.	Terrible	I. & S.	7575	279 10	59 0	24 7	2	6230	Brest	1881	..	19½	17¾	3	2 16·5-in., 4 3·9-in. Q.F., 2 1·8-in., 16 M.	4	14·5	400	332
c.d.s., b.	Tonnant	I.&S.	5091	248 7	58 5	17 3	1	1935	Rochefort	1880	..	18	14½	3	2 13·4-in., 4 M.	..	11·5	200	197
c.d.s., t.	Tonnerre	I. &S.	5858	248 0	57 9	21 4	1	4165	Toulon	1875	..	13	12	2	2 10·8-in., 4 1·8-in. Q.F., 6 M.	2	14·01	400	249
c.b. & b.	Trident	W.	8857	317 9	56 4	29 1	1	5083	Toulon	1876	.	8½	6¼	½	8 10·8-in., 2 9·4-in., 6 5·5-in.. 2 Q.F., 14 M.	6	14·17	650	730
a.c.	Turenne	W. & I.	6349	265 9	57 2	23 11	2	4160	Lorient	1879	..	10	8	2	4 9·4-in., 2 7·4-in., 6 5·5-in., 12 M.	2	14·14	500	450
c.d.s., t.	Valmy	S.	6592	293 9	57 4	23 3	2	8954	St. Nazaire	1892	578,957	17¾	17¾	4	2 13·4-in., 4 3·9-in. Q.F., 4 1·8-in. 10 M.	2	16·7	300	297
a.c.	Vauban	I.	6208	267 9	57 3	24 0	2	4560	Cherbourg	1882	..	10	8	2	4 9·4-in., 1 7·6-in., 6 5·5-in., 12 M.	2	14·32	550	440
d.s., t.	Vengeur	I. &S.	4709	248 0	57 9	16 9	2	2030	Cherbourg	1878	..	13	12	2	2 12·5-in., 4 1·8-in. Q.F., 6 M.	2	10·83	200	107

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Material.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
2nd cl. *cr.*	Alger	S.	4382	346 0	45 3	19 6	2	8254	Cherbourg	1889	280,000	..	3½	4 6·4-in. Q.F., 6 5·5-in., 10 other Q.F., 10 M.	4	19·61	860	325
g. v.	Amiral Parseval	W. & I.	869	197 6	28 0	12 2	1	918	Rochefort	1879	33,772	..	..	4 5·5-in., 4 M.	..	12·33	150	116
3rd cl. *cr.*	Amiral Rigault de Genouilly.	W.	1756	236 3	35 5	17 0	1	2043	Brest	1876	62,796	..	..	8 5·5-in., 8 M.	..	14·49	200	198
2nd cl. *cr.*	Aréthuse	W.	3665	277 6	43 6	21 9	1	4200	Toulon	1882	..	..	..	4 6·4-in., 22 5·5-in., 8 M.	..	14·0	500	474
g. v.	Aspic	C.	476	145 4	23 10	10 6	1	453	Rochefort	1880	..	..	..	2 5·5-in., 2 3·9-in.	..	10·3	50	80
to. g. b.	Bombe	S.	420	196 10	21 7	5 11	2	2000	Havre	1885	..	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
2nd. cl. *cr.*	Bugeaud	S.	3740	308 6	43 6	20 6	2	9000	Cherbourg	1893	308,650	2 shield	3	6 6·4-in. Q.F., 4 3·9-in., 8 1·8-in., 11 1·4-in.	6	18·9*t*	587	358
g. v.	Capricorne	W.	483	148 4	23 10	10 5	1	443	Havre	1882	..	..	..	2 5·5-in., 2 3·9-in.	..	11·18	70	80
to. g. b.	Casabianca	S.	960	262 6	26 10	11 6	2	5200 *t*	Bordeaux	1895	98,985	..	½	1 3·9-in. Q.F., 3 2·5-in. 5 1·8-in. 4 1·4-in.	..	22·0*t*	116	143
2nd. cl. *cr.*	Cassard	S.	3952	325 6	44 11	20 6	2	10,143 *t.*	Cherbourg	1896	318,712	2 shield	2½	6 6·4-in., Q.F., 4 3·9-in., 10 1·8-in., 3 1·4-in., 2 M.	2	19·8*t*	630	385
to. g. b.	Cassini	S.	958	262 6	27 4	11 6	2	5500 *t*	Bordeaux	1894	98,500	..	½	1 3·9-in. Q.F., 3 2·5-in. 4 1·4-in.	2	21·2*t*	110	118
2nd. cl. *cr.*	Catinat	S. Shd.	4065	331 10	44 8	21 1	2	9000	Havre	1896	324,992	2 shield	2½	4 6·4-in. Q.F., 10 3·9-in., 10 1·8-in., 4 1·4-in. M.	2	19·0	563	384
1st cl. *cr.*	Cécille	I. & S.	5933	378 9	49 3	19 9	2	10,200	La Seyne	1888	299,666	..	4	8 6·4-in. Q.F., 10 5·5-in., 6 1·8-in., 14 M.	4	19·0	940	486
2nd cl. *cr.*	Chasseloup-Laubat	S.	3758	308 6	43 6	20 10	2	9000	Cherbourg	1893	256,320	..	3	6 6·4-in. Q.F., 4 3·9-in., 8 1·8-in., 12 1·4-in. M.	6	19·25	587	358
1st cl. *cr.*	Châteaurenault	S. Shd.	8018	442 10	55 9	24 6	3	23,000	La Seyne	Bldg.	606,656	2 shield	2½	2 6·4-in. Q.F., 6 5.5-in., 10 1·8-in.	..	23	1400	625

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Coëtlogon	S.	1932	312 0	30 5	14 0	2	5800	St. Nazaire	1889	134,000	..	1½	4 5·5-in. Q.F., 3 other Q.F., 4 M.	5	19·3	200	190
g. v.	Comète	C.	495	151 6	24 9	10 6	1	631	Cherbourg	1884	..	..	..	2 5·5-in., 2 3·9-in., 2 M.	..	12.2	60	84
to. cr.	Condor	S.	1243	216 6	29 3	15 5	2	3800	Rochefort	1885 1896	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	17·7	160	134
3rd. cl. *cr.*	Cosmao	S.	1954	312 0	30 5	14 0	2	6000	Bordeaux	1888	133,000	..	..	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20·5	200	190
to. g. b.	Couleuvrine	S.	435	196 10	21 7	5 11	2	2047	Havre	1885	33,778	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
to. g. b.	Dague	S.	408	196 10	21 7	5 11	2	2000	Havre	1885	36,119	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
2nd. cl. *cr.*	D'Assas	S.	4000	325 6	44 11	20 6	2	9500	St. Nazaire	1896	292,682	2 shield	2¼	6 6·4-in. Q.F., 4 3·9-in., 10 1·8-in., 11 1·4-in.	2	19·25	630	393
2nd. cl. *cr.*	Davout	S.	3017	297 6	40 0	17 6	2	8881	Toulon	1890	221,827	..	3	6 6·4-in. Q.F., 4 3·9-in., 4 2·5-in., 4 1·8., 6 M.	4	20·07	600	336
g. v.	Décidée	S.	645	184 8	26 3	12 2	1	900	Havre	Bldg.	..	..	..	2 3·9-in. Q.-F., 4 2·5-in., 4 1·4-in.	..	13·0	99	99
1st. cl. *cr.*	D'Entrecasteaux	S. shd.	8114	383 7	58 6	25 9	2	13,500	La Seyne	1896	667,740	10–2¾ H.S.	4	2 9·4-in., 12 5·5-in Q.F., 12 1·8-in.	6	19·0	650	521
2nd. cl. *cr.*	Descartes	S. shd.	3990	326 0	42 4	21 4	2	9000 *t*	St. Nazaire	1894	334,725	..	1½	4 6·4-in. Q.F., 10 3·7-in., 8 1·8-in., 4 1·4-in.	2	21·0 *t*	552	386
3rd. cl. *cr.*	D'Estaing	W. & I.	2435	262 5	37 5	18 8	1	3700	Brest	1879	84,718	..	..	15 5·5-in., 8 M.	..	15·31	300	264
3rd. cl. *cr.*	D'Estrées (ex K 1)	S. shd.	2452	311 8	39 4	17 8	2	8500	Rochefort	1897	208,200	..	..	2 5·5-in. Q.F., 4 3·9-in., 8 1·8-in., 2 1·4-in.	..	20·5	345	234
to. g. b.	D'Iberville	S.	967	262 6	27 0	11 2	2	5060	St. Nazaire	1893	99,120	..	½	1 3·9-in. Q.F., 1 2·5-in., 4 1·4-in.	6	21·4	117	118
to. g. b.	Dragonne *	S.	410	196 10	21 7	5 11	2	2000	Havre	1885	36,074	..	..	4 5·5-in. Q.F., 3 M.	2	18·0	100	63
2nd. cl. *cr.*	Dubourdieu	W.	3577	253 7	46 6	22 10	1	3300	Cherbourg	1884	154,553	..	..	4 6·4-in., 12 5·5-in., 10 M.	2	14·0	600	496
2nd cl. *cr.*	Du Chayla	S. shd.	3952	325 6	44 11	20 6	2	10,009 *t*	Cherbourg	1895	315,835	2 shield	2¼	6 6·4-in. Q.F., 4 3·9-in., 10 1·8-in., 3 1·4-in., 2 M.	2	20·2 *t*	624	385
2nd cl. *cr.*	Duguay-Trouin	I. & W.	3593	296 3	43 4	20 6	1	4399	Cherbourg	1877	132,116	..	..	5 6·4-in., 5 5·5-in., 4 1·8-in. Q.F., 5 M.	2	15·9	700	311
g. v.	Dumont d'Urville	W.	889	201 11	28 6	13 8	1	1081	Havre	1878	33,602	..	..	4 5·5-in., 1 3·9-in., 1 2·5-in., 2 M	..	11·6	200	116
to. g. b.	Dunois (ex M 3)	S.	896	256 0	27 10	12 8	2	7000	Cherbourg	1897	123,383	..	..	6 2·5-in. Q.F., 6 1·8-in.	..	23·0	137	128
3rd cl. *cr.*	Dupetit Thouars	W.	2049	257 10	35 9	16 0	1	2018	Brest	1874	58,220	..	..	10 5·5-in, 8 M.	..	15·07	300	200
2nd cl. *cr.*	Duquesne	I. & W.	5986	333 5	50 3	25 6	1	6589	Rochefort	1876	221,570	..	..	7 6·4-in. Q.F., 14 5·5-in., 8 M.	..	16·8	900	550
to. g. b.	Durandal ‡	S.	300	180 5	19 5	10 6	2	4800	Havre	Bldg.	..	..	..	1 2·5-in. Q.F., 6 1·8-in..	2	26·0	45	48
3rd cl. *cr.*	Éclaireur†	I. & W.	1769	236 3	35 5	17 0	1	2050	Toulon	1877	16,232	..	..	8 5·5-in., 6 M.	..	15·0	200	195
to. cr.	Epervier	S.	1288	216 6	29 3	15 5	2	3200	Rochefort	1885	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	17·6	160	134
to g. b.	Espingole ‡	S.	300	180 § 5	19 5	10 6	2	4800	Havre	Bldg.	..	..	..	1 2·5-in. Q.F., 6 1·8-in..	..	26·0	45	48
g. v.	Étoile	C.	502	149 3	24 7	8 4	2	450	France.	1885	29,782	..	..	6 3·9-in., 1 2·5-in., 2 M.	..	10·0	60	77
3rd cl. *cr.*	Fabert	W.	2100	294 4	36 0	18 4	1	1107	Rochefort	1874	61,967	..	..	8 5·5-in., 4 M.	..	12·42	300	218
to. cr.	Faucon	S.	1239	216 6	29 3	15 5	2	3200	Toulon	1887	80,000	..	1½	5 3·9-in. Q.F., 1 2·5-in., 6 M.	5	18·0	150	134
to g. b.	Fauconneau ‡	S.	300	180 § 5	19 5	10 6	2	4800	Havre	Bldg.	..	..	..	1 2·5-in. Q.F., 6 1·8-in..	2	26·0	45	48
to. g. b.	Flèche	S.	425	196 10	21 7	5 11	2	2000	Havre	1885	37,517	..	..	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
3rd cl. *cr.*	Fleurus †.	S.	1310	229 8	29 2	15 4	2	4000	Cherbourg	1893	128,530	..	..	5 3·9-in. Q.F., 6 1·8-in., 4 M.	..	17·1	118	179
„ „	Forbin	S	1820	312 0	30 5	16 0	2	5700	Rochefort	1888	123,739	..	1½	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20·6	200	190
„ „	Forfait	W. & I.	2464	249 4	38 0	18 0	1	2764	Toulon.	1879	77,019	..	..	15 5·5-in., 8 M.	..	13·44	400	264
cr.	Foudre (torpedo transport)	S.	6090	370 6	52 6	23 6	2	11,900 *t*	Bordeaux	1895	407,712	..	3½	10 3·9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	19·9 *t*	840	410
2nd cl. *cr.*	Friant	S.	3739	308 6	43 6	20 10	2	9500	Brest	1893	308,750	..	3	6 6·4-in. Q.F., 4 3·9-in. 8 1·8-in. 6 1·4-in.	2	18·19	587	358
g. v.	Fulton	W.	913	199 5	28 5	12 8	1	850	Lorient	1887	37,000	..	..	2 5·5-in., 1 3·9-in., 5 M.	..	13·0	160	116
„	Gabès	C.	493	151 6	24 9	10 6	1	450	Rochefort	1884	28,624	..	..	2 5·5-in., 2 3·9-in.	..	11·0	60	84
3rd cl. *cr.*	Galilée	S.	2317	330 2	34 6	17 10	2	6600	Rochefort	1896	208,152	2 shields	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 8 1·4-in.	..	20·0	226	248

* Converted experimentally into a howitzer gunboat. † New machinery, 1896. ‡ More properly classed as Destroyers. § M. Weyl gives length 183 ft. 9 in.

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
1st cl. *cr.*	Guichen	S. shd.	8277	436 4	54 10	24 7	3	24,000	St. Nazaire	1897	611,945	2 shield	2½	2 6·4-in. Q.F., 6 5·5-in., 10 1·8-in.	..	23·0	1460	625
to. g. b.	Hallebarde	S.	300‡	180 5	19 5	10 6	2	4800	Havre	Bldg.	..	..	..	1 2·5-in. Q.F., 6 1·8-in.	2	26·0	45	48
d. v.	Inconstant	W.	891	199 5	28 5	12 7	1	850	La Seyne	1886	37,000	..	..	2 5·5-in., 1 3·9-in., 5 M.	..	13·0	160	116
2nd cl. *cr.*	Iphigénie (Training ship)	W.	3431	244 6	46 6	22 4	1	2800	..	1881	115,323	..	..	6 6·4-in., 2 3·5-in., 10 M.	1	14·6	400	391
3rd cl. *cr.*	Infernet (ex K 2)	S shd.	2452	311 8	39 4	15 6	2	8500	Bordeaux	Bldg.	..	..	..	2 5·5-in. Q.F., 4 3·9-in. 8 1·8-in.	..	20·5	..	234
2nd cl. *cr.*	Isly	S.	4477	346 0	43 6	19 6	2	8100	Brest	1891	252,760	..	3	4 6·4-in. Q.F., 6 5·5-in., 14 2·5-in. and 1·8-in., 8 M.	5	18·3	880	332
1st cl. *cr.*	Jurien de la Gravière (D 2)	S. shd.	5500	440 0	48 8	22 0	3	17,000	Lorient	Bldg.	..	..	3	8 6·4-in. Q.F., 12 1·8-in.	2	23·0	600	511
2nd cl. *cr.*	Jean Bart	S.	4109	346 0	43 6	19 6	2	8000	Rochefort	1889	283,240	..	4	4 6·4-in. Q.F., 6 5·5-in., 14 2·5-in., and 1·8-in., 8 M.	5	19·0	940	332
g. v.	Kersaint	S. shd.	1243	226 0	34 5	15 0	1	2200	Rochefort	1897	107,933	..	..	1 5·5-in. Q.F., 5 3·9-in., 7 1·4-in.	..	15·0	199	110
to. g. b.	La Hire (ex M 4)	S.	896	256 0	27 10	12 9	2	7000	Cherbourg	Bldg.	123,383	..	..	6 2·5-in. Q.F., 6 1·8-in.	..	23·0	137	128
3rd cl. *cr.*	Lalande	S.	1926	311 6	31 2	14 0	2	6000	Bordeaux	1888	133,800	..	1½	6 5·5-in. Q.F., 8 other Q.F., 4 M.	5	22·0	200	190
to. g. b.	Lance	S.	402	196 10	21 7	5 11	2	2000	Havre	1886	39,964	..	..	4 1·8-in., Q.F., 3 M.	2	18·0	100	63
3rd cl. *cr.*	Lapérouse	W. & I.	2372	262 5	37 5	18 8	1	2280	Brest	1877	85,347	..	..	15 5·5-in., 8 M.	..	14·73	300	264
" "	Lavoisier	S.	2317	330 2	34 6	17 10	2	6400	Rochefort	1897	202,024	2 shield	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 2 1·4-in., 4 M.	2	20·0	226	248
to. g. b.	Léger	S.	517	197 0	23 0	10 6	2	2360	Lorient	1891	52,000	..	..	1 3·9-in. Q.F., 3 2·5-in., 4 1·4-in.	3	18·8	130	69
" "	Lévrier	S.	505	197 0	23 0	10 6	2	2240	Lorient	1891	52,000	..	..	1 3·9-in. Q.F., 3 2·5-in., 4 1·4-in.	3	18·5	130	69
3rd cl. *cr.*	Linois	S.	2345	321 6	34 6	17 5	2	6600	La Seyne	1894	163,014	3·9	1½	4 5·5-in. Q.F., 2 3·9-in., 8 1·8-in., 4 1·4-in., 4 M.	4	20·5	200	248
g. v.	Lion	C.	503	151 6	24 9	10 6	1	576	Havre	1884	23,146	..	..	2 5·5-in., 4 M.	..	11·8	70	84
" "	Lutin	C.	493	141 9	23 11	9 4	1	373	Cherbourg	1877	20,295	..	..	2 5·5-in., 2 3·9-in.	..	10·0	60	77
" "	Lynx	C.	485	141 9	23 11	9 4	1	427	Cherbourg	1878	21,478	..	..	2 5·5-in., 2 3·9-in.	..	10·38	60	77
g. v.	Météore	C.	504	151 6	24 9	10 6	1	434	Cherbourg	1886	26,262	..	..	2 5·5-in., 3 M.	..	10·0	70	77
3rd cl. *cr.*	Milan	S.	1733	303 2	32 10	14 7	2	3986	St. Nazaire	1886	89,058	..	..	5 3·9-in. Q.F., 8 M.	2	18·1	400	186
2nd cl. *cr.*	Naiade	I. shd.	3686	246 0	47 2	22 10	1	2700	Toulon	1881	128,275	..	..	2 6·4-in., 18 5·5-in., 10 M.	..	13·68	500	490
3rd cl. *cr.*	Nielly	W. & I.	2400	262 5	37 5	18 8	1	2921	Brest	1880	84,037	..	..	15 5·5-in., 8 M.	..	15·23	300	264
g. v.	Papin	W. & I.	891	199 6	28 6	13 7	1	855	La Seyne	1886	37,000	..	..	2 5·5-in., 1 3·9-in., 5 M.	..	13·0	160	116
2nd cl. *cr.*	Pascal	S.	4015	326 0	42 4	21 4	2	9000 *t*	Toulon	1895	322,321	..	1½	4 6·4-in Q.F., 10 3·9-in., 8 1·8-in., 4 1·4-in. M.	2	20·0 *t*	650	378
3rd cl. *cr.*	Primauguet	W. & I.	2447	262 5	37 5	18 8	1	2268	Rochefort	1882	108,592	..	..	15 5·5-in., 8 M.	..	14·50	300	264
2nd cl. *cr.*	Protet (ex E 4)	S. shd.	4065	331 10	44 8	21 1	2	9000	Bordeaux	Bldg.	324,992	2 shield	2½	4 6·4-in. Q.F., 10 3·9-in., 10 1·8-in., 4 1·4-in. M.	2	19·0	563	384
3rd cl. *cr.*	Roland	W.	2476	249 4	38 0	17 7	1	2294	Cherbourg	1882	84,184	..	..	15 5·5-in., 8 M.	..	14·50	350	264
to. g. b.	Sainte Barbe	S.	437	196 10	21 7	5 11	2	2000	Rouen	1885	43,233	..	1½	4 1·8-in. Q.F., 3 M.	2	18·0	100	63
"	Salve	S.	413	196 10	21 7	5 11	2	2000	Rouen	1886	42,538	..	1½	4 1·8-in. Q.F., 3 M.	2	18·0	100	63

‡ More properly classed as a Destroyer.

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
g. v.	Scorpion	C.	505	151	6	24	9	10	6	1	511	Havre	1883	23,459	..	..	2 5·5-in., 3 M.	..	11·0	70	84
2nd cl. *cr.*	Sfax	S.& W.	4634	288	9	49	3	24	9	2	6522	Brest	1884	200,000	..	1½	6 6·4-in. Q.F., 10 5·5-in., 10 M.	2	16·84	715	473
2nd cl. *cr.*	Suchet	S.	3334	318	3	43	6	17	6	2	9000	Toulon	1893	226,360	..	3	4 6·4-in. Q.F., 4 3·9-in., 4 1·8-in., 12 1·4-in., 6 M.	7	20·0	480	246
3rd cl. *cr.*	Surcouf	S.	2044	312	0	30	5	14	0	2	6000	Cherbourg	1888	131,200	..	1½	4 5·5-in. Q.F., 8 other Q.F., 4 M.	5	20·5	200	190
g. v.	Surprise	S.	627	184	8	24	7	12	3	1	853 *t*	Havre	1895	50,954	..	..	2 3·9-in. Q.F., 4 2·5-in., 4 1·4-in.	..	13·4 *t*	73	99
1st cl. *cr.*	Tage	S. shd.	7589	390	0	53	8	22	10	2	12,410	St. Nazaire	1886	93,857	..	..	8 6·4-in., 10 5·5-in., 2 2·5-in., 6 Q.F., 14 M.	7	19·0	1000	400
2nd cl. *cr.*	Tourville*	I. & W.	5576	333	5	50	3	25	4	1	7466	La Seyne	1876	271,499	..	..	7 6·4-in. Q.F., 14 5·5-in., 8 M.	..	16·89	800	550
3rd cl. *cr.*	Troude	S.	2026	311	6	31	2	14	0	2	6000	Bordeaux	1888	33,383	..	1½	4 5·5-in. Q.F., 8 other do., 4 M.	5	20·9	200	190
3rd cl. *cr.*	Vautour	S.	1235	216	6	29	3	15	5	2	3391	Toulon	1886	87,733	..	1½	5 3·9-in. Q.F., 1 2·5-in. do., 6 M.	5	17·3	150	134
g. v.	Vipère	C.	486	145	4	23	10	10	6	1	441	Rochefort	1881	26,835	..	..	2 5·5-in., 2 3·9-in.	..	10·3	60	80
,,	Voltigeur	W. & I.	943	199	5	28	5	12	7	1	999	Brest	1878	23,077	..	..	4 5·5-in., 4 M.	..	12·48	150	116
3rd cl. *cr.*	Wattignies	S.	1292	230	0	29	3	15	0	2	4189	Rochefort	1891	111,000	..	..	5 3·9-in. Q.F., 6 1·8-in., 7 1·4-in., M.	4	18·61	160	180

* New engines, 1893.

GERMANY.—Armoured Ships.

Class.	NAME.	Material.	Displacement.	Length.	Beam.	Mean Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	ins.	ins.	ins.			knots.	tons.	
c. d. s. b. . .	**Aegir** . . .	S.	3600	236 6	50 6	17 9	2	4800	Kiel . .	1895	233,500	9 1/2 H.S.	8 H.S.	3	3 9·4-in., 10 3·4-in. Q.F. 6 M.	3 (1 sub)	17·0	225 †	255
2nd. cl. *b.*	**Baden*** . . .	I.	7441	321 6	60 0	15 8	2	4917	Kiel . .	1880 1896	444,886	16	10	3	6 10·2-in., 8 3·4-in. Q.F., 1 l., 8 M.	5 (2 sub)	14·0	700	376
a. g. b. .	**Basilisk** . .	I.	1109	154 3	36 0	10 2	2	759	Bremen . .	1878	58,042	8	8	2	1 12-in., 2 3·3-in., , 2 M.	2	9·0	40	76
2nd. cl. *b.*	**Bayern** . .	I.	7441	321 6	60 0	19 8	2	4917	Kiel . .	1878 1896	406,660	16	10	3	6 10·2-in., 8 3·4-in. Q.F., 1 l., 8 M.	5 (2 sub)	14·0	700	376
c. d. s. b. . .	**Beowulf** . .	S.	3500	259 2	49 3	17 9	2	4800	Bremen . .	1890	175,000	9 1/2	8	1	3 9·4-in., 8 3·4-in. Q.F., 6 M.	4	16·0	225	225
1st. cl. *b.* . .	**Brandenburg** . .	S.	10,100	354 4	65 0	24 7	2	9640	Stettin (Vulcan)	1891	606,500	15 3/4 comp.	11 3/4 comp.	2 1/2	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 8 M., 2 l.	7	16·5	750	552
a. g. b. .	**Biene** . . .	I.	1109	154 3	36 0	10 2	2	759	Bremen . .	1876	62,853								
a. g. b. .	**Camäleon** . .	I.	1109	154 3	36 0	10 2	2	759	Bremen . .	1878	57,564	8	8	2	1 12-in., 2 3·3-in., 2 M. .	2	10·0	40	76
"	**Crocodil** . . .	I.	1109	154 3	36 0	10 2	2	759	Bremen . .	1879	57,237								
1st. cl. *cr.*	**Deutschland** . .	I.	7319	280 0	62 4	24 7	1	5360	Poplar . .	1874	412,022	10	8	2	8 10·2-in., 7 5·9-in., 9 3·4-in. Q.F., 12 M., 2 l.	5	14·5	710	668
t.	**Deutschland (Ersatz)**‡	Kaiser Friedrich III. class.								Pro.	..	..	..	..	..	..	..	..	..
3rd. cl. *t.* . .	**Friedrich der Grosse**	I.	6770	307 0	53 6	24 7	1	5400	Kiel . .	1874	365,170	9 1/4	8 br. 10 tur.	..	4 10·2-in., 2 6·6-in., 10 3·4-in. Q.F., 8 M., 2 l.	4	14·0	550	537

* Receiving new machinery, a fighting mast with two tops, and part new armament.

† Also liquid fuel.

‡ Estimates of 1898–99.

GERMANY.—Armoured Ships—*continued.*

Class	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.	in.			knots.	tons.	
a. c.	Fürst Bismarck (ex Ersatz Leipzig)	S. shd.	10,650	393 8	66 9	26 0	3	14,000	Kiel	1897	..	7¾ H. S.	7¾ H. S.	3 H. S	4 9·4-in. Q.F., 12 5·9-in. Q.F., 10 3·4-in., 10 1·4-in., 8 M.	6 (5 sub)	19.0	1000†	565
c. d. s. b.	Frithjof	S.	3500	240 0	49 3	17 9	2	4800	Bremen	1891	175,000								
c. d. s. b.	Hagen	S.	3500	240 0	49 3	17 9	2	4516	Kiel	1893	..								
c. d. s. b.	Heimdall	S.	3500	240 0	49 3	17 9	2	4393	Wilhelmshaven	1892	233,500	9¼ H. S.	7¾ H. S.	3	3 9·4-in., 8 3·4-in. Q.F., 6 M.	4	16·0	225	225
c. d. s. b.	Hildebrand	S.	3500	240 0	49 3	17 9	2	4413	Kiel	1892	218,000								
a. g. b.	Hummel	I.	1109	143 0	36 0	10 2	2	759	Bremen	1881	56,741	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
1st. cl. cr.	Kaiser	I.	7531	292 0	62 4	24 7	1	5700	Poplar	1874	411,301	10	10	2	8 10·2-in., 1 5·9-in., 6 4-in., 9 3·4-in. Q.F., 2 M., 2 l.	5	14·6	710	668
t	Kaiser (Ersatz)*		Kaiser Friedrich III. class.						..	Pro.	..	..	..	..	..	..	..	..	..
t	Kaiser Friedrich III. (ex Ersatz Preussen)								Wilhelmshaven	1896									
	Kaiser Wilhelm II. (ex Ersatz Fried. der Grosse)	S.	11,130	377 4	67 0	25 8	3	13,000	Wilhelmshaven	1897	706,000	11¾ H. S.	9¾–6 H. S.	3	4 9·4-in. Q.F., 18 5·9-in. Q.F., 12 3·3-in., 12 1·4-in., 8 M.	6 (5 sub)	18·0	650	655
	König Wilhelm (Ersatz)								Kiel (Germania)	Bldg.									
1st. cl. cr.	König Wilhelm	I.	9757	355 0	60 0	26 7	1	8350	Blackwall	1868 1896	505,141	12	6	2½	20 5·9-in. Q.F., 18 3·4-in., 8 M., 4 l.	5	14·7	700	759
1st. cl. b.	Kurfürst Friedrich Wilhelm.	S.	10,100	354 4	65 0	24 7	2	9959	Wilhelmshaven	1891	653,000	15¾ comp.	11¾ comp.	2½	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 8 M., 2 l.	7	16·0	750	552
a. g. b.	Mücke	I.	1109	154 3	36 0	10 2	2	759	Bremen	1877	60,960	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
a. g. b.	Natter	I.	1109	154 3	36 0	10 2	2	759	Bremen	1880	52,822	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
c. d. s. b.	Odin	S.	3600	236 6	50 6	17 9	2	4800	Danzig	1894	..	9½ H. S.	7¾ H. S.	3	3 9·4 in., 10 3·4-in. Q.F., 6 M.	3 (1 sub)	16·0	225†	266
2nd cl. b.	Oldenburg	S.	5200	246 0	59 0	19 6	2	3900	Stettin	1884	235,342	13 comp.	8 comp.	1	8 9·4-in. (Krupp), 2 3·4-in. Q.F., 6 M.	4	13·5	475	356
3rd cl. t.	Preussen	I.	6770	308 6	53 6	24 7	1	4383	Stettin	1873	351,904	9	8 10	..	4 10·2-in. (Krupp), 2 6·6-in., 10 3·4-in. Q.F., 6 M., 2 l.	4	14·0	550	537
a. c. 1st. cl.	Prinz Adalbert* (Ersatz)	S.	..	..	..	..	..	..	..	Pro.	..	..	..	..	..	..	..	..	..
2nd cl. b.	Sachsen	I.	7441	321 6	60 0	19 8	2	4917	Stettin	1877 1896	422,178	15¾	10	3	6 10·2-in. (Krupp), 8 3·4-in. Q.F., 1 l., 8 M.	5 (2 sub)	14·0	700	376
c. d. s. b.	Siegfried	S.	3500	240 0	49 3	17 9	2	4800	Kiel (Germania)	1889	175,000	9½	7¾	3	3 9·4-in., 6 3·4-in. Q.F., 6 M.	4	16·0	225†	225
a. g. b.	Salamander	I.	1109	154 3	36 0	10 2	2	759	Bremen	1880	56,914								
„	Skorpion	I.	1109	154 3	36 0	10 2	2	759	Bremen	1877	60,796	8	8	2	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
„	Viper	I.	1109	154 3	36 0	10 2	2	759	Bremen	1876	61,463								
„	Wespe	I.	1109	154 3	36 0	10 2	2	759	Bremen	1876	53,771								
1st cl. b.	Weissenburg	S.	10,100	354 4	65 0	24 7	2	9000	Stettin (Vulcan)	1891	659,475								
„	Wörth	S.	10,100	354 4	65 0	24 7	2	10,224 (t)	Kiel	1892	595,250	15¾	11¾	2½	6 11-in., 6 4·1-in. Q.F., 8 3·4-in., 8 M., 2 l.	7	16·0‡	750†	552
2nd cl. b.	Württemberg	I.	7441	321 6	60 0	19 8	2	4917	Stettin	1878 1896	402,512	15¾	10	3	6 10·2-in. (Krupp), 8 3·4-in. Q.F., 1 l., 8 M.	5 (2 sub)	14·0	700	376

* Estimates of 1898–99 Fürst Bismarck class. † Also liquid fuel. ‡ Wörth: trial, 17·2 knots.
The Arminius, Friedrich Carl, and Kronprinz are now used for harbour service.

GERMANY—Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
3rd cl. *cr.*	Alexandrine	I. S. & W.	2373	236 3	42 7	18 4	1	2400	Kiel	1885	102,877	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	..	267
" "	Arcona	I. S. & W.	2373	236 3	42 7	18 4	1	2400	Danzig	1885	109,875	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	..	267
" "	Blitz	S.	1382	246 0	32 10	13 5	2	2839	Kiel	1882	66,935	..	..	6 3·4-in., 4 M.	1	16·0	250	127
cr.	Blücher	I. & W.	2856	244 4	44 10	19 8	1	2990	Kiel	1877	136,408	..	..	2 5·9-in., 6 M.	7	14·0	400	206
g. b.	Bremse	S.	866	203 5	27 10	10 6	1	1500	Bremen	1884	49,308	..	2½	1 8·2-in.	..	15·0	65	73
g. b.	Brummer	S.	866	203 5	27 10	10 6	1	1500	Bremen	1884	52,422	..	2½	1 8·2-in.	..	15·0	65	73
3rd cl. *cr.*	Bussard	S.	1857	256 0	30 2	18 4	2	2900	Danzig	1890	..	..	3	8 4·1-in. Q.F., 7 M.	2	16·5	400	..
" "	Carola*	I. & W.	2169	226 4	42 7	18 4	1	2100	Stettin	1880	109,617	..	..	6 5·9-in., 2 4·1-in. Q.F., 8 3·4-in.	..	14·0	250	267
" "	Falke	S. & W.	1731	246 0	33 6	15 0	2	2900	Kiel	1891	..	..	3	8 4·1-in. Q.F., 7 M.	2	15·5	400	..
2nd cl. *cr.*	Freya	S.	5650	344 5	57 0	21 8	3	10,000	Danzig	1897	..	4 H.S.	4 H.S.	2 8·2-in. Q.F., 8 6-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	3 sub.	20	500†	440
" "	Gefion	S.	4207	344 6	48 8	..	2	9000	Elbing, (Schichau)	1893	..	..	3	8 5·9-in., 10 4·1-in. Q.F., 6 1·9-in., 1 l., 2 M.	2	20·0	950	312
3rd cl. *cr.*	Geier	S. & W. shd.	1776	249 4	34 10	15 6	2	2960	Wilhelmshaven	1894	..	..	3	8 4·1-in. Q.F., 7 M.	2	16·2	400	..
" "	Greif	S.	2000	318 0	32 0	13 0	2	5400	Kiel	1886	..	..	..	2 3·4-in. Q.F., 4 M.	..	23·0	..	130
4th cl. *cr.*	"G"	S. & bronze shd.	2650	328 0	38 7	15 9	2	6000	Kiel (Germania)	Bldg.	130,000	..	2	10 4·1-in. Q.F., 14 1·4-in., 4 M., 2 l.	3	19·5	..	200
g. v.	Habicht	I. & W.	848	174 0	29 6	11 5	1	600	Elbing	1879	33,054	..	..	5 4·9-in., 5 M.	..	12·0	..	128
2nd cl. *cr.*	Hansa (N)	S. shd.	5900	345 7	57 10	21 8	3	10,000	Stettin (Vulcan)	1898	..	4 H.S.	4 H.S.	2 8·2-in. Q.F., 8 6-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	3 sub.	20	500	440
d. v.	Hela ("H")	S.	2000	328 0	36 0	..	2	5860	Bremen	1895	..	..	1½	4 3·4-in. Q.F., 6 1·9-in., 2 M.	3	20·0	347	169
2nd cl. *cr.*	Hertha ("K")	S.	5650	344 6	57 0	21 8	3	10,000	Stettin (Vulcan)	1897	..	4 H.S.	4 H.S.	2 8·2-in. Q.F., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	(3 sub)	20·0	500†	440
g. b.	Hyäne	I.	489	139 8	25 1	9 10	1	340	Wilhelmshaven	1878	24,840	..	..	1 4·9-in., 1 3·4-in., 4 M.	..	9·0	..	83
g. b. *g. b.*	Hyäne (Ersatz) Iltis (Ersatz)	S.	894	203 6	29 10	10 8	2	1300	Elbing	Bldg.	100,000	..	..	8 3·4-in. Q.F., 6 1·4-in., 2 M.	..	13·5	160	..
2nd cl. *cr.*	Irene	S.	4400	339 6	46 0	21 0	2	8000	Stettin	1887	220,000	..	3	4 5·9-in., 8 4·1-in. Q.F., 6 1·9-in., 1 l., 8 M.	4	19·8	900	358
3rd cl. *cr.*	Jagd	S.	1250	275 6	31 6	13 9	2	4000	..	1888	..	..	2	4 3·4-in. Q.F., 2 M.	3	20·0	..	126
1st cl. *cr.*	Kaiserin Augusta	S. (shd.)	6331	393 0	49 3	23 0	3	14,000	Kiel (Germania)	1892	..	..	3½	12 5·9-in., 8 3·4-in. Q.F., 2 l., 8 M.	5	22·5	..	427
to. g. b.	Komet	S.	946	262 6	31 2	13 9	2	5000	Stettin	1892	..	..	2	4 3·4-in. Q.F., 2 M.	1	21·0 (*t*)	..	90
3rd cl. *cr.*	Kondor	S. & W.	1640	246 0	33 6	15 0	2	2930	Hamburg	1892	..	..	3	8 4·1-in. Q.F., 7 M.	2	16·5	400	..
3rd cl. *cr.*	Kormoran	S. & W.	1640	246 0	33 6	15 0	2	2930	Danzig	1892	.	..	3	8 4·1-in. Q.F., 7 M.	2	16·0	400	..
3rd cl. *cr.*	Marie	I. & W.	2100	226 4	42 7	18 4	1	2100	Hamburg	1881	..	..	..	8 5·9-in., 2 3·4-in. Q.F., 1 l., 6 M.	..	13·5	..	267
d. v.	Meteor	S.	946	262 6	29 6	11 6	2	4500	Gaarden	1890	..	..	2	2 3·4-in. Q.F., 2 M.	3	21·0	..	90
3rd cl. *cr.*	Nixe §	I. & W.	1760	177 2	42 8	18 0	1	700	Danzig	1885	..	..	..	8 5·9-in.	..	10·5	..	116
3rd cl. *cr.*	Olga	I. & W.	2100	226 4	42 7	18 4	1	2100	Stettin	1880	113,812	..	..	8 5·9-in., 2 3·4-in. Q.F., 1 l., 6 M.	..	14·0	..	267
3rd cl. *cr.*	Pfeil	S.	1382	246 0	32 10	13 5	2	2700	Wilhelmshaven	1882	73,605	..	..	4 3·4-in. Q.F., 4 M.	1	16·0	250	127
2nd cl. *cr.*	Prinzess Wilhelm	S.	4400	339 6	46 0	21 0	2	8000	Gaarden	1887	220,000	..	3	4 5·9-in., 8 4·1-in. Q.F., 6 1·9-in., 1 l., 8 M.	4	18·7	900	358
4th cl. *cr.*	Schwalbe	S. & W.	1120	203 0	30 6	12 4	2	1500	Wilhelmshaven	1887	..	..	3	8 4·1-in. Krupp, 7 M.	..	13·5	300	150
3rd cl. *cr.*	Seeadler	S. & W.	1640	246 0	33 6	15 0	2	2800	Hamburg	1892	..	..	3	8 4·1-in., 7 M.	2	16·0	400	156
3rd cl. *cr.*	Sophie	I. & W.	2100	226 4	42 7	18 4	1	2100	Danzig	1892	117,155	..	..	8 5·9-in., 2 3·4-in. Q.F., 1 l., 6 M.	..	14·0	..	267

* Gunnery ship for quick-firing guns. † Displacement with 950 tons of coal, 6100 tons. Provision made for liquid fuel. § Training Ship.

GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£		in.			knots	tons.	
4th cl. *cr.*	Sperber	S. & W.	1120	236 0	29 8	12 6	2	1500	Wilhelmshaven	1888	..	..	3	8 4·1-in., 6 M.	..	13·5	300	150
2nd cl. *cr.* / 2nd cl. *cr.*	Victoria Luise (L.) / Vineta (M.)	S.	5650	344 5	57 0	21 8	3	10,000	Bremen / Stettin	1897	..	4 H.S.	4 H.S.	2 8·2-in. Q.F., 8 6-in. Q.F., 10 3·4-in., 10 1·4-in., 4 M.	3 sub.	20·0	500	440
3rd cl. *cr.*	Wacht	S.	1250	275 6	31 6	13 9	2	4000	Bremen	1887	..	..	2	4 3·4-in. Q.F., 2 M.	3	19·6	..	126
g. b.	Wolf	I.	480	139 8	25 1	9 10	1	340	Wilhelmshaven	1878	24,343	..	..	1 4·9-in., 1 3·4-in., 4 M.	..	9·0	..	83
„	Wolf (Ersatz)*	S.	..	..	..	..	..	..	..	Pro.	..	..	..	..	..	..	..	..
d. v.	Zieten	I.	975	196 10	29 6	11·6	1	2323	Blackwall	1876	81,755	..	..	4 1·9-in. Q.F., 6 M.	..	16·0	140	111
„	Zieten (Ersatz)*	S.	..	..	..	..	..	..	..	Pro.	..	..	..	..	..	..	..	..

The Charlotte, Mars, Grille, Hay, Ulan, Gneisenau, Moltke, Stein and Stosch, in addition to others given in the list, are used as schoolships.
The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 8 1·9-in. Q.F., but provision is made for mounting 3 4·1-in., 12 1·9-in. Q.F. and 4 M.
A station vessel for Constantinople has been bought and named Loreley, the older ship having been removed from the list.

* Estimates of 1898–99.

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Displacement.	Length.	Beam.	Draught of Water.	Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft. in.	ft. in.	ft. in.		knots.		
Hamburg-American S.S. Co.	Fürst Bismarck	10,500	502 0	57 6	22 3	16,400	19½	1891	8 5·9-in., 4 4·7-in., 2 3·4-in. Q.F., 2 2·2-in., 14 M.
	Normannia	10,500	498 9	57 6	22 3	16,250	19	1890	
	Columbia	9,500	462 6	56 0	19 8	13,680	19	1889	
	Augusta Victoria	9,500	459 3	56 0	23 0	12,280	18	1889	
North German Lloyd	Spree	8,900	462 6	51 10	22 0	12,770	19	1890	
	Havel	8,900	462 6	51 10	22 3	12,770	19	1890	
	Lahn	7,700	449 6	49 0	22 0	9,500	18½	1887	
	Kaiser Wilhelm der Grosse	20,000	625 0	66 0	27 0	27,000	22	1897	Not known.
	Aller	4,965	436 6	48 0	..	1,300(a)	16	1885	
	Saale	4,965	436 6	48 0	..	1,300(a)	16	1886	
	Trave	4,965	436 6	48 0	..	1,300(a)	16	1886	

(a) Nominal horse-power.

GREECE.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
												Belt.	Battery.	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.	ins.			knots.	tons.	
c.d.s.	Basileos Georgios	I.	1774	200 2	36 0	15 6	2	2100	Blackwall	1867	..	7	6	9	2 6·6-in. (Krupp), 1 5·9-in. 9 M.	1	12 0	210	120
br.	Basilissa Olga* .	W.	2030	230 0	59 0	18 0	1	1950	San Rocco	1869	..	6	4½	..	4 6·6-in. 5½-ton (Krupp), 2 6·6-in. 3½-ton, 4 M., 4 l. .	3	10·0	240	400
b.	Hydra . .	S.	4885	334 6	51 10	23 3	2	7000	St. Nazaire	1889	.. }								
b.	Psara . . .	S.	4885	334 6	51 10	23 3	2	7000	Havre . .	1890	.. }	11¾	13½	2½	3 10·6 in. Canet, 5 5·9 in. do. Q.F., 4 4·41-in. Q.F., 2 2·2-in., 16 M.	3	17·0	600	400
b.	Spetsai . .	S.	4885	334 6	51 10	23 3	2	7000	Havre . .	1889	.. }								

* Has received two fighting masts and new machinery; similar changes in the Georgios.

The Psara, Hydra and Spetsai are intended to receive 1 3·9-in. Q.F. and 8 2·5-in. Q.F. guns (Canet), in addition to the present armament, but the transformation has been deferred.

GREECE.—Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			Metric tons.	ft.	in.	ft.	in.	ft.	in.	no.									knots.	tons.	
g.v.	Acheloos . .	S.	420	130	0	24	6	11	6	1	400	Blackwall	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
g.v.	Alphios . . .	S.	420	130	0	24	6	11	6	1	400	Blackwall	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
g.v.	Aphroessa . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp) .	..	9·0	30	..
g.v.	Eurotas . . .	S.	420	130	0	24	6	11	6	1	400	Dumbarton	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·0	50	..
corv.	Hellas (training) .	W.	1654	200	2	37	0	19	4	1	1500	Northfleet	1858 rep. 1878–90	.	..	..	6 5·9-in. (Krupp), 2 M. .	..	11·0	230	..
cr.	Mykale (transport) .	S.	1000	210	6	32	6	18	0	2	2400	Glasgow	1880	..	..	..	2 M.	..	1·4	..	..
corv.	Nauarchos Miaulis	I. & W.	1800	246	0	36	0	14	5	1	2200	La Seyne	1879	..	..	..	3 6·6-in., 5½-ton (Krupp), 1 6·6-in. 3½-ton do., 2 M., 4 l.	..	15·0	220	250
g.v.	Paralos . . .	I.	380	123	0	23	11	9	10	1	204	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp), 1 M. .	..	8·0	60	..
g.v.	Pinios . . .	S.	420	130	0	24	6	12	6	1	400	Dumbarton	1884	..	..	..	2 3·7-in. (Krupp), 3 M. .	..	10·55	50	..
g.v.	Plixaura . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1856	..	..	..	1 3·4-in. (Krupp) . .	..	9·0	55	..
g.v.	Salaminia . .	I.	380	123	0	23	11	9	10	1	200	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp), 1 M. .	..	8·0	60	..
corv.	Sfaktirea . .	S.	1000	216	6	29	3	18	0	1	2400	England	1885	..	..	..	2 3·9-in. (Krupp), 2 M. .	..	14·5	100	100
g.v.	Syros . . .	I.	380	124	7	22	11	9	10	1	160	Pt. Glasgow	1858	..	..	..	1 3·4-in. (Krupp) . .	..	9·0	18	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 2 Whitehead torpedo-launching guns on broadside, 2 under-water torpedo tubes ahead. 14 knots speed.

There are also 2 gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knot speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885; 4 gunboats, A. B. Γ. Δ. (52 tons, 1 4·7-in. Krupp), launched 1881; and 3 mining vessels (300 tons), launched 1881.

ITALY.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			Metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	ins.			knots.	tons.	
t.	Affondatore	I.	4062	290 0	40 0	20 0	1	3240	Millwall	1865	197,600	5	5	2	2 28-ton (Armstrong), 6 4·7-in. Q.F., 2 2·9-in., 4 2·2-in., 4 1·4-in., 2 M.	2	12·0	460	303
"	Ammiraglio di St. Bon	S.	9800	344 6	69 4	24 9	2	13,500	Venice	1897	..	9¾–4 H.S.	9¾ H.S.	3–1½	4 10-in., 8 6-in. Q.F., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	5	18·0	1000	..
a.c.	Ancona	I.	4460	256 0	50 0	25 0	1	2548	Bordeaux	1864	172,000	4½	4½	..	6 6-in. Q.F., 6 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	3	12·0	485	423
b.	Andrea Doria	S.	11,000	328 2	65 4	27 2	2	10,500	Spezia	1885	765,500	18 comp.	18 comp.	3	4 105-ton (Armstrong), 2 6-in. 4 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub)	16·1	850	509
a.c.	Carlo Alberto	S.	6500	325 0	59 0	22 11	2	13,000	Spezia	1896	..	6 H.S.	6 H.S.	1½	12 6-in. Q.F., 6 4·7-in., 2 2·9-in., 10 2·2-in., 10 1·4-in., 2 M.	5	20·0	1000	460
a.c.	Castelfidardo	I.	4250	256 0	50 0	21 11	1	2125	St. Nazaire	1863	233,000	4½	4½	13¾	6 6-in. Q.F., 6 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	3	12·0	485	423
t.	Dandolo *	I&S	11,202	340 11	64 9	26 7	2	8045	Spezia	1878	872,640	21½	18	2	4 10-in. (Armstrong), 7 6-in. Q.F., 5 4·7-in., 2 2·9-in., 10 2·2-in., 14 1·4-in., 2 M.	4	15·6	1000	487
t.	Duilio *	I&S	11,138	340 11	64 9	26 7	2	7710	Castellammare.	1876	850,400	21½	18	2	4 10-in. (Armstrong), 7 6-in. Q.F., 5 4·7-in., 2 2·9-in., 10 2·2-in., 14 1·4-in., 2 M.	4	15·0	1000	487
t.	Emanuele Filiberto	S.	9800	344 6	69 4	24 9	2	13,500	Castellammare.	1897	..	9¾–4	9¾	3–1	4 10-in., 8 6-in. Q.F., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	5	18·0	1000	..
b.	Francesco Morosini	S.	11,000	328 2	65 4	27 2	2	10,000	Venice	1885	770,680	18 comp.	18 comp.	3	4 105-ton (Armstrong), 2 6-in., 4 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub)	17·0	850	509
a.c.	Giuseppe Garibaldi†	S.	6840	328 0	59 8	24 0	2	13,000	Sestri Ponente.	1897	520,000	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.	4	20·0	600	533
b.	Italia.	S.	14,387	400 6	74 0	31 2	2	11,986 (t)	Castellammare.	1880	1,167,680	16 funnel op'nings	19 comp.	3	4 100-ton (Armstrong), 8 6-in., 4 4·7-in. Q.F., 12 2·2-in., 24 1·4-in., 2 M.	4	18·0	1650	748
b.	Lepanto	S.	14,400	400 6	74 0	31 2	2	15,800 (t)	Leghorn (Orlando)	1883	1,150,880	16 funnel op'nings	19 comp.	3	4 100-ton (Armstrong), 8 6-in., 4 4·7-in. Q.F., 12 2.2-in., 34 1·4-in., 2 M.	4	18·38	1650	748
a.c.	Marco Polo	S.	4583	327 0	48 3	19 6	2	10,000	Castellammare.	1890	344,400	4	4	1	6 5·9-in. Q.F., 10 4·7-in., 2 2·9-in., 9 2·2-in., 4 1·4-in., 2 M.	5 (1 sub.)	19·0	..	315
a.c.	Maria Pia	I.	4268	256 0	49 4	22 7	1	2924	La Seyne	1863	215,000	4½	4½	..	8 5·9-in., 6 4·7-in. Q.F., 2 2·9-in. 10 2·2-in. 10 1·4-in., 2 M.	2	12·0	485	423
b.	Re Umberto	S.	13,825	400 0	76 9	28 6	2	19,500	Castellammare.	1888	1,058,500	4	18	3	4 67-ton (Armstrong), 8 6-in. Q.F., 16 4·7-in., 2.9 in., 15 2·2-in., 14 1·4-in., 2 M.	8	19·0	1200	785
b.	Ruggiero di Lauria.	S.	11,000	328 2	65 4	27 2	2	10,600	Castellammare.	1884	777,560	18 comp.	18 comp.	3	4 105-ton (Armstrong), 2 6-in. 4 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2 sub.)	17·0	850	509
a.c.	San Martino (training service)	I.	4268	256 0	49 4	22 7	1	2620	La Seyne	1863	213,880	4½	4½	..	8 5·9-in., 6 4·7-in. Q.F., 2 2·9-in., 10 2·2-in., 10 1·4-in., 2 M.	2	12·0	490	423
b.	Sardegna	S.	13,860 (t)	411 0	76 9	28 6 (t)	2	20,800 (t)	Spezia	1890	1,057,440	4	14¾ comp.	3	4 67-ton (Armstrong), 8 5·9-in. Q.F., 16 4·7-in., 2 2·9-in., 20 2·2-in., 10 1·4-in., 2 M.	5	20·0 (t)	1200	785
"	Sicilia	S.	13,375	400 0	76 9	28 6	2	19,500	Venice	1891	1,050,000	4	18 comp.	3	4 67-ton (Armstrong), 8 5·9-in. Q.F., 16 4·7-in., 2 2·9-in., 20 2·2-in., 10 1·4-in., 2 M.	5	19·2	1200	785
a.c.	Varese†	S.	6840	328 0	59 8	24 0	2	13,000	Leghorn (Orlando)	1897	..	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.	4	20·0	1000	470
a.c.	Vettor Pisani	S.	6500	325 0	59 0	22 11	2	13,000	Castellammare.	1895	..	6 H.S.	6 H.S.	1½	12 6-in. Q.F., 6 4·7-in., 2 2·9-in., 10 2·2-in. 10 1·4-in., 2 M.	5	20·0	600	..

* New armament given. † To replace two cruisers of the same name sold before completion to the Argentine and Spanish Governments. It is stated (March, 1898) that the Varese has been sold to Spain.
Note—The Palestro, Principe Amedeo, and Roma are non-effective, or only available for coast defence. An armoured cruiser of 10,000 tons displacement is projected, with 18,000 I.H.P. and 23 knots speed.

ITALY.—Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.			knots.	tons.	
to.cr	Agordat	S.	1313	289	0	30	6	11	1	2	..	Castellammare	Bldg.	..	..	1	4 4·7-in. Q.F., 6 2·2-in., 2 1·4-in.	2	23·0	..	111
3rd cl. *cr.*	Amerigo Vespucci (training)	S.	2795	255	11	42	7	17	0	1	3340	Venice	1882	176,300	..	¾	6 5·9-in., 4 2·2-in., 8 1·4-in., 2 1., 4 M.	2	14·0	500	265
g.v.	Andrea Provana	S.	649	167	4	26	3	10	2	1	1080	Leghorn (Orlando)	1884	39,760	..	..	4 4·7 in., 3 1·4-in., Q.F.	..	13·0	120	103
d.v.	Archimede	S.	784	230	0	26	3	10	0	1	1700	Venice	1887	60,120	..	..	4 4·7-in., 2 2·2-in. Q.F., 2 1·4-in.	2	16·0	210	109
to.g.b.	Aretusa	S.	846	230	0	26	10	11	9	2	4420	Leghorn (Orlando)	1891	72,920	..	1	1 4·7-in., 6 2·2-in., and 3 1·4-in.	6	20·7	180	111
3rd cl. *cr.*	Calabria	S.	2442	249	4	42	0	16	7	2	4094 *t.*	Spezia	1894	183,120	..	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	16·4 *t.*	500	257
to.g.b.	Calatafimi	S.	840	229	6	27	0	10	2	2	4000	Castellammare	1893	72,920	..	1	1 4.7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	20·0	120	111
,,	Caprera	S.	853	230	0	27	4	10	2	2	4800	Leghorn (Orlando)	1894	72,920	..	1	2 4·7-in. Q.F., 4 2·2-in., 2 1·4-in. Q.F.	5	21·0	180	111
g.v.	Cariddi	W.	1050	177	2	28	6	12	5	1	956	Castellammare	1875	65,480	..	..	2 4·7-in., 4 2·2-in. Q.F.	..	10·0	164	..
,,	Castore	S.	530	116	0	36	0	9	6	1	364	Pozzuoli (Armstrong)	1889	68,120	..	..	1 15·7-in. (Krupp), 2 1·4-in. Q.F.	..	8·0	..	40
to.cr.	Coatit	S.	1313	289	0	30	6	11	1	2	..	Castellammare	Bldg.	..	..	1	4 4·7-in. Q.F., 6 2·2-in., 2 1·4-in.	2	23·0	..	111
to.g.b.	Confienza	S.	768	230	0	25	6	9	0	2	1887	Spezia	1887	61,480	..	1	1 4·7-in. Q.F., 6 2·2-in., 2 1·4-in.	4	17·0	180	111
3rd cl. *cr.*	Cristoforo Colombo	S.	2675	249	0	36	0	17	6	..	3800	Venice	1892 Reblt	157,240	..	..	6 4·7-in., 4 2·2-in., Q.F., 4 1·4-in.	..	16·0	500	203
g.v.	Curtatone	S.	1040	177	3	32	8	13	6	1	1100	Venice	1887	58,440	..	..	6 4·7-in. Q.F., 4 2·2-in., 2 1·4-in., 2 M.	..	12·0	197	131
3rd cl. *cr.*	Dogali	S.	2088	250	0	37	0	14	6	2	7600	Elswick	1887	156,040	4½	2	6 6-in. (Armstrong), 1 2·9-in., 9 2·2-in. Q.F., 2 1·4-in., 2 M.	4	19·66	480	257
,,	Elba	S.	2730	272	6	40	8	16	7	2	7471 (*t*)	Castellammare	1893	200,000	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	4	17·9*t*	..	257
2nd cl. *cr.*	Etna	S.	3530	282	2	42	7	19	0	2	7480	Castellammare	1885	226,720	5	1½	2 9·8-in. (Armstrong), 6 5·9-in., 1 2·9 in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·8	630	315
to.g.b.	Euridice	.	840	229	6	27	0	10	2	2	4000	Castellammare	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	5	19·8*t*	120	111
3rd cl. *cr.*	Etruria	S.	2280	262	6	39	6	16	7	2	7585 (*t*)	Leghorn (Orlando)	1891	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 M.	2	19·84	400	257
2nd cl. *cr.*	Fieramosca	S.	3600	290	0	43	6	19	4	2	7700	Leghorn (Orlando)	1888	240,120	5	1½	2 9·8-in., 6 6-in. Q.F., 1 2·9-in., 5 2·2-in., 8 1·4-in., 2 M.	4	17·5	590	315
3rd cl. *cr.*	Flavio Gioja (training)	S.	2533	255	11	42	7	17	0	1	4150	Castellammare	1881	193,920	..	1½	6 5·9-in., 4 2·2-in. Q.F., 8 1·4-in., 2 1., 4 M.	2	15·0	500	265
to.g.b.	Folgore	S.	370	187	0	19	8	6	7	2	2040	Castellammare	1886	39,840	..	..	2 6-pr. and 4 3-pr. Q.F.	4	20·0	60	45
d.v.	Galileo	S.	770	230	0	26	3	8	2	1	1700	Venice	1887	56,720	..	..	4 4·7-in., 2 2·2-in. Q.F., 2 1·4-in.	2	15·0	210	109
3rd cl. *cr.*	Giovanni Bausan	S.	3068	275	7	42	7	18	4	2	6500	Elswick	1883	179,120	5	1½	2 9·8-in. (Armstrong), 6 5·9-in., 1 2·9-in., 4 2·2-in. Q.F., 8 1·4-in., 2 M.	3 (1sub.)	17·5	600	267
to.g.b.	Goito	S.	812	230	0	25	6	11	9	2	2620	Castellammare	1887	70,680	..	1	4 2·2-in. Q.F., 5 1·4-in.	5	19·0	180	111
g.v.	Governolo	S.	1255	185	0	33	9	13	9	1	1100	Venice	1894	58,440	..	...	4 4·7-in. Q.F., 4 2·2-in., 2 1·4-in., 2 M.	..	13·0	200	131
to.g.b.	Iride	S.	840	229	6	27	0	10	2	2	4000	Castellammare	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	19·6	120	111

ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Liguria	S.	2280	262 6	39 4	16 9	2	7677 (*t*)	Sestri (Ansaldo)	1893	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 M. (2 Maxims).	2	18·0	430	257
,, ,,	Lombardia	S.	2380	262 6	39 6	16 7	2	6843 (*t*)	Castellammare.	1890	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	2	17·0*t*	430	257
d.v.	Marcantonio Colonna	S.	656	216 6	23 11	10	1	1700	..	1879	51,480	..	..	5 2·2-in. Q.F., 2 M.	..	15·4	197	100
to.g.b.	Minerva	S.	846	246 0	27 6	11 9	2	4800	Sestri (Ansaldo)	1892	72,720	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	5	19·0	120	111
,,	Montebello	S.	814	230 0	25 6	11 9	3	2776	Spezia	1888	74,120	..	1	6 2·2-in. Q.F., 2 1·4-in.	4	19·0	100	111
,,	Monzambano	S.	840	230 0	25 6	11 9	3	1953	Spezia	1888	70,680	..	1	6 2·2-in. Q.F., 2 1·4-in.	4	17·0	100	111
,,	Partenope	S.	840	246 0	27 6	11 9	2	4200	Castellammare.	1890	71,000	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	5	19 0	100	111
3rd cl. *cr.*	Piemonte	S.	2500	300 0	38 0	15 0	2	12,000	Elswick	1888	220,000	3	3	6 6·6-in. Q.F., 6 4·7-in., 10 2·2-in., 6 1·4-in., 4 M.	3	21·0	560	296
g.v.	Polluce	S.	530	116 0	36 0	9 6	1	390	Pozzuoli (Armstrong)	1889	68,120	..	..	1 4·7-in. (Krupp), 2 1·4-in. Q.F.	..	8·0	..	40
3rd cl. *cr.*	Puglia	S.	2550	273 0	40 9	16 9	2	1000	Taranto	Bldg.	..	4½	1	4 5·9-in. Q.F., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 M.	..	20·0	650	257
3rd cl. *cr.* / ,,	Principe di Napoli / Regina Margherita	S.	2500	282 0	42 8	16 9	2	6500	..	Pro.	..	..	2	4 5·9-in. Q.F., 6 4·7-in., 8 2·2-in.	..	20·0	..	..
d.v.	Rapido	I.	1568	262 5	30 6	12 6	1	1920	Leghorn (Orlando)	1876	77,400	..	..	5 2·2 in. Q.F., 2 M.	..	13·4	300	135
to.g.b.	Saetta	S.	400	187 0	19 8	6 7	2	2400	Castellammare.	1887	38,880	..	..	2 2·2-in. Q.F., 4 1·4-in.	3	20·0	90	58
cr.	Savoia (used as the Royal Yacht)	S.	2850	275 6	42 7	17 0	1	3340	Castellammare.	1883	176,160	..	1·5	6 2·2-in. Q.F., 6 1·4-in., 4 1., 2 M.	2	14·0	600	216
g.v.	Scilla	W.	1076	177 2	28 6	12 5	1	826	Castellammare.	1874	65,520	..	..	4 2·2-in. Q.F., 2 M.	..	10·0	140	111
,,	Sebastiano Veniero	S.	629	170 0	26 3	10 6	1	1160	Leghorn (Orlando)	1884	36,160	..	..	4 4·7-in., 3 1·4-in. Q.F.	..	13·0	150	103
d.v.	Staffetta	I.	1388	252 7	30 10	13 2	1	1800	S. Pierdarena (Ansaldo)	1876	82,600	..	..	4 4·7-in., 7 1·4-in. Q.F.	1	13·5	300	135
2nd cl. *cr.*	Stromboli	S.	3475	282 2	42 7	19 0	2	6252	Venice	1886	220,080	5	1·5	2 9·8-in. (Armstrong), 6 5·9-in., 1 2·9-in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·0	630	315
to. g.b.	Tripoli	S.	848	230 0	25 10	11 9	3	2543	Castellammare.	1886	72,080	..	1	4 2·2-in. Q.F., 4 1·4-in.	5	18·0	130	111
3rd cl. *cr.*	Umbria	S.	2280	262 6	39 6	16 7	2	7104 (*t*)	Leghorn (Orlando)	1891	183,120	4½	2	4 5·9-in. Q.F., 6 4·7-in, 8 2·2-in., 10 1·4-in., 1 1., 2 M.	4	18·83 (*t*)	430	257
to. g.b.	Urania	S.	846	230 0	27 0	11 2	2	4000	Sestri (Odero)	1891	72,920	..	1	1 4·7-in. Q.F., 6 2·2-in., 3 1·4-in.	6	20·0	120	111
d.v.	Vedetta	I.	827	183 9	26 11	11 5	1	670	Genoa	1866	32,400	..	..	4 4·7-in., 6 1·4-in. Q.F.	..	11·0	137	40
2nd cl. *cr.*	Vesuvio	S.	3427	282 2	42 7	19 0	2	6820	Leghorn (Orlando)	1886	218,320	5	1·5	2 9·8-in., 6 5·9-in., 1 2·9-in., 5 2·2-in. Q.F., 8 1·4-in., 2 M.	4	17·0	600	315
g.v.	Volturno	S.	1040	177 3	32 8	14 4	1	1100	Venice	1887	58,960	..	..	4 4·7-in., 4 2·2-in. Q.F., 2 1·4-in., 2 M.	..	13·0	206	131

Subsidised auxiliary cruisers and despatch vessels.—Nord America, Vittoria, Duca de Galliera, and Duchessa di Genova (La Veloce S.S. Co.), Regina Margherita, Elettrico, Candia and Malta (Navigazione Generale). The armament of these vessels is 2 4·7-in. Q.F., and 4 1·4-in. M. A cruiser of 1100 tons displacement, 7000 I.H.P., and 22 knots speed, is projected.

JAPAN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.†	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.					inches.	inches.	inches.			knots.	tons.	
t.	Asahi . . .	S.	15,200	400 0	75 0	27 3	2	15,000	Clydebank .	Bldg	..	9–4 H. S.	14–10 H. S.	4–2½	4 12-in., 14 6-in Q.F., 20 12-pr., 8 3-pr., 4 2½-pr.	5 (4 sub)	..	..	..
a.c.	Asama . . .	S.	9750	408 0	67 0	24 § 3	2	18,000	Elswick .	Bldg.	..	7 H. S.	6	..	4 8-in. Q.F., 14 6-in. (Armstrong).	..	21·5	1300	..
a.c.	Azuma . . .	S.	9436	445 10	59 6	28 0	2	17,000	Rochefort .	Bldg.	..	6	..	3	4 8-in., 12 6-in. Q.F., 12 3-in., 12 1·8-in.	5 (4 sub)	..	..	..
b.	Chin-Yen . . (Ex. Chen Yuen)	S.	7400	308 5	59 0	20 0	2	6200	Stettin . .	1882	..	14	12	3	4 12-in. (Krupp), 2 5·9-in., 8 l., 8 M.	3	14	1000	250
a.c.	Chiyoda . .	S.	2450	308 0	42 6	14 0	2	5700	Clydebank .	1889	..	4½	..	1–2	10 4·7-in. Q.F., 14 3-pr., 3 M.	3	17·5	420	300
b. *b.*	Yashima . . Fuji . .	S.	12,320	374 0	73 0	26 6	2	14,000	Elswick Thames	1896	..	18—6 H. S.	14 H. S.	2½ H. S.	4 12-in., 10 6-in. Q.F., 20 3-pr., 4 4½-pr.	5 (4 sub)	19·2 18·5 (*i*)	1100	600
c.b.	Fu-So ‡. . .	I.	3718	220 0	48 0	18 4	2	3500	Thames .	1877	..	7	9	..	4 9·4-in. (Krupp), 2 6·6-in., 4 l., 5 M.	..	13·2	360	386
a.c.	Hi-yei * . .	C.	2200	231 0	40 9	17 4	1	2490	Milford .	1878	..	4½	..	..	3 6·6-in. (Krupp), 6 5·9-in., 4 M., 1 l.	..	13·0	280	308
"	Kon-go * . .	C.	2200	231 0	40 9	17 4	1	2450	Hull . .	1877	..	4½	..	..	3 6·6-in. (Krupp), 6 5·9-in., 4 M., 1 l.	..	13·7	280	308
c.d.s.	Ping-Yuen-Go . (Ex. Ping Yuen.)	S.	2000	200 0	40 0	16 0	2	2400	Foo Chow .	1890	..	8	5	2	1 10·2-in. (Krupp), 2 5·9-in., 6 M.	4	11·0	350	250
a.c.	Riojo * . . .	C.	2459	213 0	34 0	17 4	1	975	Thames .	1864	..	4½	..	..	1 6-in. (Krupp) . . .	..	9·0	350	306
b. *b.*	Shikishima . Unnamed .	S.	14,850	400 0	75 6	27 3	2	14,500	Thames . Elswick .	Bldg.	..	9–4 H. S.	14–6	3–5	4 12-in., 14 6-in. Q.F., 20 12-pr., 8 M.	5 (4 sub)	18·5	700	741
a.c. *a.c.*	Tokiha . . Unnamed .	S.	9750	408 0	67 0	24 § 3	2	18,000	Elswick .	Bldg.	..	7 H. S.	6	..	4 8-in. Q.F., 14 6-in. (Armstrong).	..	21·5	1300	..
a.c.	Yakumo . .	S.	9850	407 9	64 4	23 9	2	16,000	Stettin .	Bldg.	..	7–3½	6	2½	4 8-in. (Armstrong) Q.F., 12 6-in., 12 12-pr. (Armstrong), 7 2½-pr.	5 (4 sub)	20·0	600	500

* These are now used as training ships; they have no armour as against end-on fire, and no armoured deck.
‡ Lost off Shikoku Island, 1897, after collision with the Matsushima.
† All Q.F. guns and 12-in. for new ships are Armstrong.
§ Mean draught.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
g.v.	Akagi	S.	615	164 0	27 0	10 0	1	700	Japan	1889	..	..	..	1 8·2-in., 1 5·9-in., 2 l., 2 M.	..	13·0	..	113
t.g b.	Akasaki	S.	875	240 0	27 6	13 0	2	5500	Japan	1895	..	..	..	2 4·7-in. Q.F., 4 3-pr.	5	21·0	200	..
cr.	Akashi	S.	2700	306 9	40 0	16 4	2	8500	Japan (Yokosuka)	1895	327,000	..	2–1	2 6-in. Q.F. (Armstrong), 6 4·7-in., 12 3-pr., 4 M.	2	20·0	200	..
cr.	Akitsushima	S.	3150	302 0	42 7	18 5	2	8400	Japan	1892	..	4½	3	4 6-in. Q.F., 6 4·7-in., 10 3-pr.	4	19·0	..	330
g.v.	Atago	S.	615	154 0	27 0	10 6	2	700	Japan	1887	..	..	..	1 8·2-in., 1 4·7-in., 2 M.	..	12·0	60	113
„	Banjo	W.	656	154 0	25 0	12 0	1	590	Japan	1879	..	..	..	1 6-in., 2 4¾-in., 1 M.	..	10·0	107	115
cr.	Chitose	S.	4760	396 0	49 0	17 7	2	15,500	San Fr'cisco	1898	205,200	4½	4½–1¾	2 8-in., 10 4·7-in., Q.F., 12 12-pr., 2 6-pr., 2 2½-pr.	5	22·5	350	405
„	Hashidate	S.	4277	295 0	50 10	21 2	2	5400	Japan	1891	..	12	2	1 12·5-in. (Canet), 11 4·7-in. Q.F., 5 6-pr., 11 3-pr., 6 M.	4	17·0	400	350
„	Itsukushima	S.	4277	295 0	50 10	21 2	2	5400	La Seyne	1891	..							
g.v.	Iwaki	W.	700	147 0	25 0	11 0	1	700	Japan	1883	..	..	..	1 5·9-in., 2 4·7-in.	..	10·0	600	115
„	Idzumi (ex Esmeralda)	S.	2950	270 0	40 0	18 3	2	6500	Elswick	1878	..	22	5–1	2 10·2-in. (Armstrong), 6 4·7-in. Q.F., 2 l. 6 M.	3	18·6	400	300
cr.	Kasagi	S.	4760	396 0	49 0	17 7	2	15,500	Philadelphia	1897	205,200	4½	4½–1¾	2 8-in., 10 4·7-in. Q.F., 12 12-pr., 2 6-pr., 2 2½-pr.	5	22·5	350	405
t.c.	Katsuraki, Musashi	S.	1476	206 9	36 0	15 0	2	1600	Japan	1885	..	..	..	2 6-in. (Krupp), 5 4·7-in., 2 M.	2	13·0	..	242
g.v.	Maya	S.	615	154 0	27 0	10 0	2	700	Japan	1886	..	..	..	1 8·2-in., 1 4·7-in., 2 M.	..	13·0	60	113
c.d.s.	Matsushima	S.	4277	295 0	50 10	21 2	2	5400	La Seyne	1890	..	12	2	1 12·5-in. (Canet), 11 4·7-in. Q.F., 5 6-pr., 11 3-pr., 6 M.	4	17·5	400	350
cr.	Miyaka	S.	1800	314 9	36 0	13 2	2	6130	..	Bldg.	..	..	..	2 4·7-in. Q.F., 10 1·8-in.	2	20·0	..	..
„	Naniwa	S.	3650	300 0	46 0	18 6	2	7235	Elswick	1885	..	1½	3–2	2 10·2-in. (Armstrong), 6 5·9-in. (Krupp), 2 3-pr. 10 M.	4	18·72	800	350

JAPAN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.			knots.	tons.	
g.v.	**Oshima** . . .	S.	630	164 0	27 0	10 0	1	700	Japan	1890	..	..	..	4 4·7-in., Q.F., 8 l. . .	..	13·0	..	..
cr.	**Sai yen** (ex Tsi Yuen) . .	S.	2300	263 3	33 0	15 9	2	2800	Stettin	1883	..	9	3	2 8·2-in., 1 5·9-in., 4 l. 10 M.	4	14·5	230	200
cr.	**Sei-ki**	W.	900	200 0	30 6	14 2	1	720	Japan	1875	..	..	..	1 5·9-in., 4 4·7 Q.F., 2 M. .	.	11·0	130	..
to.g.b.	**Shirane** . . .	S.	875	240 0	27 6	13 0	2	5500	Japan .	1896	..	..	..	2 4·7-in. Q.F., 4 3-pr. . .	5	21·0	200	..
cr.	**Suma**	S.	2700	306 9	40 0	16 4	2	8500	Japan . (Yokosuka)	1896	237,000	..	2–1	2 6-in. Q.F., 6 4·7-in., 12 3-pr., 4 M.	2	20·0	200	..
"	**Takao**	S.&W.	1774	230 0	33 0	13 0	2	2330	Japan .	1888	..	..	..	4 6-in. Q.F., 1 4¾-in. do., 6 M..		15·0	300	255
"	**Takachiho** . .	S.	3700	300 0	46 0	18 6	2	7500	Elswick .	1885	..	1½	3–2	2 10·2-in. (Armstrong), 6 5·9-in., 2 3-pr., 10 M. .	4	18·7	800	365
" "	**Takasago** . Unnamed . .	S.	4300	360 0	46 6	17 0	2	15,500	Elswick .	1897 Bldg.	..	..	4½	2 8-in. Q.F., 10 4·7-in., 16 3-pr.	5	24	1000*	..
to.g.b.	**Tatsuta** . . .	S.	875	240 0	27 6	13 0	2	5500	Elswick .	1894	..	..	..	2 4·7-in. Q.F., 4 3-pdr. .	5	21·0	200	..
"	**Ten-riu** . . .	W.	1500	200 0	32 0	16 5	1	1250	Japan .	1882	..	..	..	1 6·6-in. (Krupp), 6 4·7-in.. 2 l.	..	12·0	256	222
cr.	**Tsukushi** . . . (*ex* Arturo Prat)	S.	1350	210 0	32 0	15 0	2	2887	Elswick	1882	..	4½	..	2 10-in. (Armstrong), 4 4·7-in. Q.F., 2 l., 4 M.	2	16·5	250	190
"	**Yayeyama** . .	S.	1600	315 0	34 6	15 0	2	5400	Japan	1889	..	..	..	3 4·7-in. Q.F., 6 M. . .	2	20·0	..	200
"	**Yamato** . .	..	1476	206 9	36 0	15 0	1	1600	Japan .	1885	..	..	..	2 6·6-in. (Krupp), 5 4·7-in.. 4 M.	2	13·0	..	242
"	**Yoshino** . . .	S.	4180	350 0	46 6	17 0	2	15,000	Elswick .	1892	..	4½	4½–1¾	4 6-in. Q.F., 8 4·7-in., 23 3-pr.	5	23·0	1000*	300

The Naval Programme, extending over ten years, includes four battleships, six first-class, three second-class, and two third-class cruisers, three torpedo gunboats, one torpedo depot ship, eleven destroyers, and eighty-nine torpedo-boats. In addition to the new ships included in the above tables, a 20-knot cruiser (9600 tons), three cruisers of 3000 tons, three torpedo gunboats, and a despatch vessel, one building, or to be built at Yokosuka.

The gunboats Chen-Pei, Chen Pien, Chen Nan, Chen Hsi, Chen Chung and Chen Tung (440 tons) were captured from the Chinese.

* Bunker capacity.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Turret.	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	inches.			knots	tons.	
c.d.s.t.	**Bloedhond** . . .	I.	1683	182	8	46	3	10	6	2	680	Amsterdam .	1869	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·7	104	118
"	**Cerberus**	I.	1584	185	8	44	0	9	9	2	534	Amsterdam .	1869	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M	..	7·0	80	118
"	**Draak**	I.	2234	213	6	49	2	12	0	2	807	Amsterdam .	1877	..	8	11	1	2 11-in. (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	100	133
"	**Evertsen**	S.	3400	282	9	47	0	16	9	2	4735	Flushing .	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in. Q.F., 8 1·4-in.	3	16·0	280	260
"	**Haai**	I.	1580	195	2	44	0	9	6	2	672	Rotterdam .	1871	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	76	118
"	**Heiligerlee** . . .	I.	1543	187	0	44	0	9	6	2	630	Birkenhead .	1868	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	9·0	120	118
"	**Hyena**	I.	1580	192	2	44	0	9	6	2	654	Amsterdam .	1870	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·0	76	118
a.g.b.	**Isala**	I.	383	159	4	25	0	4	5	2	306	Amsterdam .	1876	..	5	5	1	2 4·7-in. (Krupp) . . .	..	7·7	28	44
t.	**Koning der Nederlanden** (I)	I.	5400	279	9	49	9	19	8	2	4500	Amsterdam .	1874	..	7½	9½	⅔	4 11-in., 4 4·7-in., 2 2·9-in., 6 1·4-in., 4 1·4-in. Q.F.	..	12·0	520	308
t. & b.	**Koningin Wilhelmina der Nederlanden**	S. shd.	4600	327	5	48	10	20	0	2	5900	Amsterdam .	1892	..	..	11	3	1 11-in., 1 8·2-in., 2 6·6-in., 2 2·9-in., 4 2·9-in. Q.F., 4 1·4-in., 6 1·4-in. Q.F., 2 M.	4	16·5	448	274
c.d.s.t.	**Kortenaer**. . .	S.	3400	282	9	46	11	16	9	2	4658	Amsterdam .	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in. Q.F., 8 1·4-in.	3	16·0	280	260
"	**Krokodil** . . .	I.	1547	187	0	44	0	9	8	2	630	Birkenhead .	1868	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	9·0	120	118
"	**Luipaard**	I.	1610	194	9	44	0	9	7	2	680	Rotterdam .	1876	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pdr. Q.F., 2 M.	..	9.0	120	118

NETHERLANDS.—Armoured Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Gun Position	Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	inches.			knts.	tons.	
c.d.s.t.	Matador	I.	2000	209	6	47	3	10	6	2	691	Rotterdam	1878	..	5½	11	..	2 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	7·5	100	130
a.g.b.	Merva	I.	383	159	4	24	11	4	5	2	395	Amsterdam	1879	..	5	5	1	2 4·7-in. (Krupp)	..	8·0	28	44
"	Mosa	I.	373	159	6	24	11	4	5	2	400	Amsterdam	1878	..	5	5	1	2 4·7-in. (Krupp)	..	8·0	28	44
b. Ram	New Ships (A 4, A 5, A 6)*	S.	3936	272	6	49	10	17	8	2	5300	..	Pro.	..	6	9½	2½	3 9·4-in., 4 4·7-in. Q.F., 6 2·9-in. Q.F., 8 1·4-in.	?	16·0	250	..
c.d.s.t.	Panter	I.	1580	159	3	44	0	9	6	2	560	Amsterdam	1870	..	5½	9½	..	1 11-in. 28-ton (Krupp), 1 2·9-in. 2 3-pr. Q.F., 2 M.	..	7·0	76	118
c.d.s.t.	Piet-Hein	S.	3400	282	9	46	11	16	9	2	4736 (*t*)	Rotterdam	1894	..	6 H.S.	9½ H.S.	2	3 8·2-in., 2 5·9-in., 6 2·9-in., Q.F., 8 1.4-in.	3	16·2 (*t*)	280	260
t.	Prins Hendrik der Nederlanden	I.	3375	240	0	44	0	17	10	2	2000	Birkenhead	1866	..	4½	10	⅝	4 9-in. 13-ton M.L.R. (Armstrong). 4 4·7-in. (Krupp), 2 2·9-in., 4 1·4-in. Q.F., 6 M.	..	11·0	380	228
t. & b.	Reinier Claeszen	S.	2479	229	5	44	4	15	0	2	350	Amsterdam	1891	..	4¾–2 *comp.*	11	3	1 8·2-in. (Krupp), 1 6·6-in., 1 2·9-in., 4 1·9-in. Q.F., 3 1·4-in.,	2	12·5	88	160
a.g.b.	Rhenus	I.	388	160	5	25	0	4	6	2	310	Amsterdam	1877	..	5	5	1	2 4·7-in. (Krupp)	..	7·5	28	44
c.d.s.t.	Schorpioen	I.	2235	205	0	38	0	16	6	2	2225	La Seyne	1868	..	6	11	1	1 11-in. 28-ton (Krupp), 2 2·9-in., 5 3-pr. Q.F., 2 M.	..	13·0	200	160
"	Stier	I.	2112	205	0	38	0	16	4	2	2250	Birkenhead	1868	..	11	8	1	1 11-in. 28-ton (Krupp), 2 2·9-in., 5 3-pr. Q.F., 2 M.	..	12·4	160	154
a.g.b	Vahalis	I.	365	126	0	27	9	5	3	2	240	Rotterdam	1870	..	4	1	½	2 3-pr. Q.F.	..	7·0	24	34
c.d.s.t.	Wesp	I.	1580	195	2	44	0	9	6	2	740	Amsterdam	1871	..	5½	9½	1	1 11-in. 28-ton (Krupp), 1 2·9-in., 2 3-pr. Q.F., 2 M.	..	8·0	76	118

* Three other armoured rams, Evertsen type, are projected.

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
cr	Alkmaar	Cp. shd.	1068	178	9	30	2	15	7	1	686	Amsterdam	1874	..	..	..	1 5·9-in. (Krupp), 6 4·7-in., 1 2·9-in., 4 1·4-in. Q.F., 2 M.	..	10·0	130	112
2nd cl. cr.	Atjeh	I. & W.	3440	301	0	41	0	21	4	1	2700	Amsterdam	1876	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 smaller.	..	13·5	440	301
g. v.	Bali (I)	I. & W. shd.	853	175	9	29	6	21	1	1	400	Rotterdam	1878	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	80	104
"	Batavia (I)	I. & W. shd.	850	175	6	29	6	11	10	1	400	Amsterdam	1876	..	..	..	1 7-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	95	104
"	Bellona	I.	920	178	5	32	9	12	6	1	310	Amsterdam	1892	..	..	..	1 5·9-in., 7 4·7-in., 3 2·9-in., 13 smaller.	..	8·5	50	87
"	Benkoelen (I)	I. & W. shd.	853	147	7	29	6	11	10	1	446	Rotterdam	1879	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·5	100	99
"	Bonaire	I. & W. shd.	853	175	6	29	6	12	7	1	412	Rotterdam	1877	..	..	..	1 5·9-in., 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F., 2 M.	..	9·0	104	84
"	Borneo (I)	Cp. shd.	800	176	6	31	0	13	4	1	1040	Glasgow	1892	..	..	..	6 4·1-in., 1 2·9-in., 2 1·4-in. Q.F., 2 M.	..	13·0	124	106
"	Ceram (I)	S. & W. shd.	550	173	2	25	7	10	3	1	800	Flushing	1887	..	..	..	3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	12·5	70	82
"	Condor (I)	Cp. shd.	350	126	0	20	0	10	0	1	300	Amsterdam	1885	..	..	..	1 2·3-in., 2 2-in.	..	10·0	26	40
2nd cl. cr.	De Ruyter	I. & W. shd.	3517	302	1	41	0	22	1	1	3300	Amsterdam	1880	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 smaller.	..	14·5	360	30
g. v.	Edi (I)	S.	810	166	0	30	9	11	9	2	1100	Flushing	Bldg.	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
"	Flores (I)	S. & W. shd.	550	173	2	25	7	11	4	1	650	Amsterdam	1887	..	..	..	3 4·7-in, 1 2·9-in., 2 1·4-in. Q.F.	..	11·7	75	82
cr.	Friesland	S.	3900	306	0	48	6	17	8	2	9250	Rotterdam	1896	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 smaller.	4	20·0	400	306

NETHERLANDS.—Cruising Ships—*continued.*

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.			knots.	tons.	
cr.	Holland	S.	3900	306	0	48	6	17	8	2	9250	Amsterdam	1896	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	20·0	400	306
g.v.	Java (I)	I. & W. shd.	1300	205	4	31	2	14	1	1	1050	Rotterdam	1885	..	..	..	1 5·9-in., 3 4·7-in., 1 2·9-in., 2 1·4-in. Q.F.	..	12·5	160	114
1st cl. cr.	Johan Willem Friso	I. & W. shd.	3732	302	1	41	4	22	8	1	3133	Amsterdam	1886	..	..	..	6 6·6-in. 6-ton (Krupp), 8 4·7-in., 2 2·9-in., 8 3-pr. Q.F., 8 M.	2	14·5	400	301
1st cl. cr.	Koningin Emma der Nederlanden	I. & W. shd.	3528	301	0	41	0	21	4	1	2730	Amsterdam	1879	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 8 3-pr. Q.F., 8 M.	..	14·0	470	301
g.v.	Lombok (I)	S. & W. shd.	600	172	0	27	3	11	0	1	990	Amsterdam	1891	..	..	..	3 4·7-in., 1 2·9-in., 2 3-pr. Q.F.	..	12·0	55	87
"	Makasser (I)	I. & W. shd.	850	177	0	29	6	11	10	1	320	Amsterdam	1877	..	..	..	1 6.3-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	8·5	96	104
"	Madura (I)	I. & W. shd.	853	177	0	29	6	11	10	1	400	Amsterdam	1880	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	85	104
"	Mataram (I)	S.	810	166	0	30	9	11	9	2	1100	Amsterdam	1896	..	..	..	3 4·7-in. Q.F., 2 3-in., 2 1·4-in.	..	13·0	113	95
"	Nias (I)	S.	810	166	0	30	9	11	9	2	1227	Amsterdam (Huygens)	1895	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	120	95
"	Padang (I)	I. & W. shd.	853	176	6	29	6	11	10	1	400	Rotterdam	1878	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·0	80	104
"	Pelikaan (I)	S. & W. shd.	400	131	2	24	1	8	8	..	485	Rotterdam	1891	..	..	..	3 4·7-in. Q.F., 1 3-in., 2 3-pr. do.	..	11·35	43	40
"	Pontianak (I)	C. shd.	730	163	8	30	3	11	9	1	360	Amsterdam	1873	..	..	..	1 6·3-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 2 1·4-in. Q.F.	..	9·5	90	104
"	Sambas (I)	C.	654	137	10	28	10	11	10	1	374	Rotterdam	1874	..	..	..	1 7-in. 7-ton M.L.R. (Armstrong), 2 4·7-in. (Krupp), 1 2·9-in., 1 1·4-in. Q.F.	..	8·5	85	100
"	Serdang (I)	S	810	166	0	30	9	11	9	2	1100	Flushing	Bldg.	..	..	..	3 4·7-in. Q.F., 2 2·9-in., 4 1·4-in.	..	13·0	113	95
sl.	Sommelsdijk	I. & W. shd.	1013	178	5	31	0	14	0	1	700	Amsterdam	1881	..	..	..	1 5·9-in., 3 4·7-in. (Krupp), 1 2·9-in.	..	10·0	150	88
cr.	Sumatra (I)	S.	1720	229	6	37	0	14	0	2	3750	Amsterdam	1890	..	..	1½	1 8·2-in., 1 5·9-in., 2 4·7-in., 1 2·9-in., 4 3-pr. Q.F., 2 M.	2	17·0	225	183
g.v.	Sumbawa (I)	S.	600	174	6	26	6	11	4	1	930	Flushing	1891	..	..	..	3 4·7-in., 1 2·9-in., 2 3-pr. Q.F.	..	12·5	60	87
"	Suriname	I. & W. shd.	884	177	0	29	6	11	5	1	440	Amsterdam	1877	..	..	..	1 5·9-in. (Krupp), 2 4·7-in., 1 2·9-in., 2 1·4-in. Q.F., 3 M.	..	9·0	105	84
1st cl. cr.	Tromp	I. & W. shd.	3512	301	0	41	0	21	4	1	2772	Amsterdam	1877	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 6 3-pr. Q.F., 2 M.	..	14·0	470	301
1st cl. cr.	Van Speyk	I. & W. shd.	3728	302	1	41	0	23	0	1	2891	Amsterdam	1880	..	..	..	6 6·6-in. 6-ton, 8 4·7-in. (Krupp), 2 2·9-in., 6 3-pr. Q.F., 2 M.	..	14·0	360	301
cr.	Zeeland	S.	3900	306	0	48	6	17	8	2	9250	Flushing	1897	285,700	..	2	2 5·9-in. Q.F., 6 4·7-in., 4 2·9-in., 8 1·4-in., 4 M.	4	20·0	400	306
g.v.	Zwaluw (I)	I. & W. shd.	340	126	0	20	0	10	0	1	240	Flushing	1882	..	..	..	2 3-in., 2 2-in.	..	10·0	26	40

Gun-vessels of the Indian Navy, Arend, Flamingo, Raaf, Reiger, Valk, Zeeduif, and Zwaan (400 tons), launched between 1880 and 1891; Glatik (417 tons), 1894; Argus and Cycloop (438 tons), 1893; Sindoro and Soembing (642 tons), built at Soerabaia, 1877–78.

Sixteen Gunboats (*Staunch class*) of 268 tons, and of 100 to 171 H.P.; also *five small gunboats*, of 210 tons, and 124 to 174 H.P., and *one steel gunboat* of 108 tons and 172 I.H.P. The new programme provides for the building of *twenty-two gun vessels* and despatch boats for the defence of the Zuyder Zee and Hollandisch Diep.

In addition to the ships indicated in the lists above, the programme, which extends to the year 1909, includes *six monitors* of two types, *six protected cruisers* (*Holland type*), *fifteen gunboats*, and *thirty-one torpedo craft.*

NORWAY.—Armoured Ships.

Class.	NAME	Material of Hull.	Displacement. (metric tons.)	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers. (no.)	Indicated Horse-power.	Where Built.	Date of Launch.	Cost. (£)	Armour. Belt. (in.)	Armour. Gun Position (in.)	Armour. Deck Plating. (in.)	Armament. Guns.	Armament. Torpedo Tubes.	Speed. (knots.)	Normal Coal Supply. (tons.)	Complement.
c.s., t.	Mjölner	I.	1515	203	5	45	11	11	10	1	450	Norrkoping	1868	66,800	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	138	80
,,	Harald Haarfagre	S.	3556	280	0	48	6	16	6	2	3700	Low Walker	1896	190,000	7 H.S.	8	..	2 8-in. Q.F., 6 4·7-in., 6 12-pr., 6 1½-pr.	2 (sub)	17·2† t.	200	..
,,	Torkenskjold												Bldg.									
,,	Skorpionen	I.	1447	200	2	45	11	11	6	1	350	Horten	1866	..	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	6·0	138	80
,,	Thor	I.	2003	203	5	49	3	13	2	1	600	Horten	1872	..	7	14¼	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	200	90
,,	Thrudvang	I.	1515	200	2	45	11	11	10	1	500	Horten	1867	..	5	12	1	2 4·7-in., 2 2·5-in. Q.F., 3 M., 1 l.	..	8·0	138	80

† Natural draught.

Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement. (metric tons.)	Length. ft.	Length. in.	Beam. ft.	Beam. in.	Draught. ft.	Draught. in.	Propellers. (no.)	Indicated Horse-power.	Where Built.	Date of Launch.	Cost. (£)	Armour. Gun Position. (in.)	Armour. Deck. (in.)	Armament. Guns.	Armament. Torpedo Tubes.	Speed. (knots.)	Normal Coal Supply. (tons.)	Complement.
g.b.	Æger	S.	393	108	6	29	6	8	0	2	450	Horten	1892	..	..	1½	1 8·2-in., 1 2·7-in. Q.F., 2 1·9-in.	..	9·0	..	..
g.v.	Ellida	W.	1000	187	0	32	8	14	4	2	900	Horten	1880	..	..	..	5 5·9-in. 4-ton (Krupp), 1 4·7-in., 1 l., 2 M.	1	12·0	97	128
,,	Frithjof	S.	1371	216	6	32	10	13	3	2	300	..	Bldg.	..	..	..	2 4·7-in. 4 2·9-in. Q.F., 4 1·4-in., 2 l.	3 (1 sub.)	..	..	..
,,	Heimdal	S.	630	167	3	26	9	11	8	1	700	Christiania	1892	..	..	..	4 2·5-in. Q.F.	..	12·0	22	..
corv.	Nord Stjernen	W.	1609	216	6	39	4	17	9	1	800	Horten	1862	..	..	..	6 6·2-in. 3-ton M.L.R., 10 8-in. smooth-bore, 3 l.	..	9·0	195	216
g.v.	Sleipner	I.	580	173	10	25	11	9	6	2	800	Horten	1877	..	..	..	1 10·2-in. 22-ton (Krupp), 1 5·9-in. 4-ton do., 1 M.	1	12·0	80	87
to.g.b.	Valkyrien	S.	380	190	0	24	2	9	2	2	3300	Elbing	1896	..	..	..	2 2·7-in. Q.F., 1 M.	2	23·2 t	..	..
g.v.	Viking	S.	1113	203	6	30	6	13	0	2	2000	Horten	1891	..	..	1½	2 5·9-in. (Arms.), 4 2·5-in Q.F., 4 1·4-in., 2 M.	3	15·0	140	..

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.
Sixteen smaller Gunboats, of 60 tons, 70 I.H.P., and 7½ knots speed; each armed with one 5½-inch gun. Also several smaller gunboats.
A first-class gunboat, No. 4, of 395 tons, in hand.

PORTUGAL.—Armoured Ship.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Battery.	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	inches.	inches.	inches.			knots	tons.	
c.b.	Vasco da Gama . .	I.	2422	200 0	40 0	18 0	2	3600	Blackwall .	1876	132,000	9	10	3	2 10·2-in. 18-ton (Krupp), 1 5·9-in., 2 2·5-in., Q.F., 2 M.	..	13·2	280	218

Cruising Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
cr.	Adamastor . .	S.	1993	250 0	35 0	14 0	2	4000	Leghorn .	1896	..	5	3	2 5·9-in. Q.F., 4 4·7-in., 4 2·2-in., 4 M.	3	18·0 t.	..	..
corv.	Affonso de Albuquerque	I. & W.	1111	203 0	33 0	13 6	1	1360	Blackwall .	1884	56,500	..	..	2 6-in. (Armstrong), 5 4·7-in., 2 2·5-in. Q.F., 2 M.	..	13·3	140	183
”	Bartholomeu Dias .	W.	2377	207 0	37 5	20 6	1	400 (nom.)	Blackwall .	1858	..	..	..	8 5-in.	..	10·0	360	271
g.v.	Bengo	I. & W.	462	125 6	24 6	9 0	1	400	Birkenhead .	1879	22,500	..	..	1 6-in., 2 3·4-in.	..	10·0	80	88
”	Diu	W.	729	147 0	27 6	13 0	1	700	Lisbon. .	1889	..	..	..	1 5·9-in. (Krupp), 2 4·7-in., 1 3-pr. Q.F., 2 M.	..	12·0	80	114
cr.	Dom Carlos I. . }	S.	4100	330 0	43 0	17 6	..	14,500	Elswick {	1897 }	..	..	4½	2 8-in. Q.F. (Armstrong), 10 4·7-in., 12 6-pr., 6 1-pr., 4 M.	5 (2 sub.)	22·0	770	..
”	Unnamed . . }									Pro. }								
g.v.	Dom Luiz I. . .	S.	721	151 0	27 3	13 8	2	..	Lisbon. .	1895	..	..	..	4 4·1-in., 3 2·5-in. Q.F., 3 M. .	..	11·0	100	..
”	Douro	W.	587	142 9	26 0	11 0	1	400	Lisbon. .	1873 1877	..	..	..	1 5·9-in. 4-ton, 2 4·7-in., 1 M.	..	10·0	85	107

PORTUGAL.—Cruising Ships—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour: Gun Position.	Armour: Deck.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.			knots.	tons.	
corv.	Duque da Terceira (training)	W.	1430	179 6	34 0	15 6	1	660	Lisbon	1864	..	..	..	2 4·7-in., 2 2·5-in. Q.F., 1 M.	..	9·0	130	178
g.v.	Liberal	I. shd.	580	140 0	25 6	10 6	1	580	Birkenhead	1884	32,500	..	..	1 6-in. 4-ton (Armstrong), 3 4-in., 2 M.	..	11·0	90	109
corv.	Mindello	C.	1124	170 0	35 9	14 0	1	900	Blackwall	1876	74,500	..	..	2 7-in. 4-ton M.L.R. (Armstrong), 4 ·47-in. 2 M.	..	11·5	130	169
g.v.	Mandovi	I. shd.	462	125 6	24 6	9 0	1	400	Birkenhead	1879	22,500	..	..	1 5·9-in., 2 3·4-in., 2 M.	..	10·0	80	86
„	Quanza	W.	587	142 9	26 0	11 0	1	500	Lisbon.	1877	..	..	..	1 5 9-in. 4-ton, 2 4·7-in., 1 M.	..	10·0	85	107
corv.	Rainha de Portugal	C.	1124	170 0	35 9	14 0	1	900	Blackwall	1876	74,500	..	..	2 7-in. M.L.R. (Armstrong), 4 4·7-in., 2 M.	..	11·5	130	169
cr.	Rainha Amelia	S.	1660	246 0	36 0	14 8	2	4500	Lisbon	Bldg	..	..	..	4 5·9-in. Q.F., 4 3·9-in., 2 3-pr., 6 M.	2	17·5	..	..
g.v.	Rio Ave	W.	378	120 0	22 0	10 6	1	180	Lisbon.	1880	..	..	..	1 4·7-in. (Armstrong), 2 3-in.	..	8·0	60	90
„	Rio Lima	I. shd.	638	148 6	27 6	10 6	1	500	Birkenhead	1875	33,000	..	..	1 7-in. 4-ton (Armstrong), 4 4-in., 2 M.	..	11·0	100	109
„	Sado	C.	645	148 6	28 0	10 6	1	500	Birkenhead	1875	35,500	..	..	1 7-in. 4-ton (Armstrong), 4 4·7-in., 1 M.	..	11·0	100	109
cr.	San Gabriel / San Rafael	S. shd.	1800	246 0	35 6	14* 3	2	2650	Havre	Bldg.	..	..	1½	2 5·9-in. (Canet), 4 4·7-in., 8 1·8-in., 2 M.	1	15·0	500	..
„	San Salvador	S.	721	151 0	27 3	13 8	2	..	Lisbon.	Bldg.	..	..	..	4 4·1-in., 3 5·2-in. Q.F., 3 M.	..	11·0	100	..
„	Tamega	C.	645	148 6	28 0	10 6	1	500	Birkenhead	1875	35,500	..	..	1 7-in. 4-ton (Armstrong), 4 4·7-in., 1 M.	..	11·0	100	109
„	Tejo	W.	587	142 9	26 0	11 0	1	400	Lisbon.	1869	..	..	..	1 5·9-in. 4-ton, 2 4·7-in.	..	10·0	85	107
„	Vouga	W.	730	160 9	27 6	12 0	1	600	Lisbon	1882	..	..	..	4 4-in., 2 1·8-in. Q.F., 2 M.	..	10·0	100	109
„	Zaire	I. shd.	580	140 0	25 6	10 6	1	580	Birkenhead	1884	32,500	..	..	1 6-in. (Armstrong), 3 4-in. 2 M.	..	11·0	90	109
„	Zambeze	W.	641	143 0	25 9	12 0	1	500	Lisbon.	1886	..	..	..	1 6-in. (Armsg.), 2 4-in., 2 M.	..	10·0	85	107
„	One unnamed.	S.	4100	360 0	47 3	17 6	..	..	Elswick	Bldg.	..	..	..	4 6-in. Q.F., 8 4 7-in., 12 3-pr.	..	22	100†	..
g.v.	One unnamed	S.	300	..	..	..	..	..	Lisbon	Bldg.	..	..	..	.. .. ..	..	..	..	..

* Mean draught. † Bunker capacity.

Ten small Gunboats and about 29 light draught steel river-gunboats. Several other vessels are projected.

RUSSIA.—Armoured Ships.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position.	Armour. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	in.	in.			knots.	tons.	
c.d.s., t.	Adm. Chichagoff	I.	3505	254	0	42	7	18	0	1	2060	St. Petersburg	1868	..	6	6	..	2 11-in. 28-ton, 4 4-pr., 6 Q.F., 4 l.	..	10·5	300	264
„	Adm. Greig	I.	3462	254	0	42	7	17	6	1	2031	St. Petersburg	1868	..	4½	6	..	3 11-in. 28-ton, 6 Q.F., 2 l.	..	10·0	300	280
„	Adm. Lazareff	I.	3462	254	0	43	0	17	6	1	2004	St. Petersburg	1867	..	4½	6	..	3 11-in. 28-ton, 6 Q.F., 4 l.	..	10·25	300	280
a.c.	Adm. Nahimoff	S. shd.	8524	333	0	61	0	25	0	2	8000	St. Petersburg	1885	572,000	10 *comp.*	8 *comp.*	3	8 8-in., 10 6-in., 10 Q.F., 4 3-pr., 6 M.	4	16·7	1200	567
c.d.s.	Adm. Oushakoff	S.	4126	265	0	52	6	17	0	2	5000	St. Petersburg	1893	410,000	10	7–8	3	4 9-in., 4 6-in. Q.F., 6 1·8-in. Q.F., 8 M.	4	16·0	400	318
„	Adm. Seniavin	S.	4126	265	0	52	6	17	0	2	5000	St. Petersburg	1894	410,000	10	7–8	3	4 9-in., 4 6-in. Q.F., 6 1·8-in., 8 1·4-in., M.	4	16·0	400	318
c.d.s., t.	Adm. Spiridoff	I.	3505	254	3	42	7	19	1	1	2007	St. Petersburg	1868	..	6	6	..	2 11-in. 28-ton, 4 4-pr., 6 Q.F., 4 l.	..	10·5	300	260
b.	Alexander II.	S. shd.	9927	326	0	67	0	23	0	2	8000	St. Petersburg	1887	..	14 *comp.*	10 *comp.*	2½	2 12-in. 50-ton, 4 9-in. 19-ton. 8 6-in., 4 6-pr. Q.F., 4 3-pr., 6 M.	5	16·5	1200	604
b.	Catherine II. (B.S.)	I. & S.	10,180	331	0	69	0	26	6	2	10,600	Nicolaieff	1886	900,000	16 *comp.*	14 *comp.*	3	6 12-in. (56-ton), 7 6-in., 8 6-pr. Q.F., 6 M.	7	15·5	886	325
c.d.s., t.	Charodeika	I.	1881	206	9	42	7	10	6	2	786	St. Petersburg	1867	..	4½	6	1	4 9-in., 2 Q.F. and 2 M.	..	8·0	250	171
a.c.	Dmitri Donskoi	S. shd.	5882	296	5	52	0	24	4	2	7000	St. Petersburg	1883	..	6	unard.	2½	2 8-in., 4 6-in. Q.F., 10 4·7-in. Q.F., 16 Q.F. and M., 4 l.	4	16·5	400	510
t.	Dvenadzat Apostoloff (Twelve Apostles) B.S.	S.	8076	330	0	60	0	25	6	2	11,500	Nicolaieff	1890	..	14 *comp.*	12 *comp.*	2½	4 12-in. 52-ton, 4 6-in., 8 3-pr. Q.F., 10 M.	6	16·6	800	500

* Great alterations have been made in the tonnages of many of the ships in this list, to accord with the tonnages given in Chapter IV. by Lieut. A. Stroumillo, of the Russian Admiralty, who may be presumed to have access to the best information.

RUSSIA.—Armoured Ships—*continued*.

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.					£	inches.	inches.	inches.			knots.	tons.	
t.	Gangoot*	S.	6592	278 0	62 0	21 0	2	8300	St. Petersburg	1890	..	16 *comp.*	7·8	2½	1 12-in., 4 9-in., 4 6-in., 10 Q.F.	5	14·7	500	58
a.c.	General Admiral	I. shd.	4722	285 5	49 3	21 0	1	4472	St. Petersburg	1873	..	6	..	..	6 8-in., 2 6-in., 10 Q.F. and M., 5 l.	4	14·2	1000	312
c.d.s.	General Admiral Apraxine	S.	4126	265 0	52 6	17 0	2	5000	St. Petersburg (New Admiralty)	1896	..	10	7·8	3	4 9-in., 4 6-in., 6 1·8-in. Q.F., 8 1·4-in.	4	16·0	215	318
c.d.s.	New Ship	S.							St. Petersburg (New Admiralty)	Bldg.	..								
a.c.	Gerzog Edinburgski	I. & W.	5050	285 5	49 3	21 0	1	5222	St. Petersburg	1875	..	6	6	..	4 8-in., 5 6-in., 12 Q.F., 6 l.	2	15·2	1000	500
b.	Georgi Pobiedonosetz (George the Victorious) B.S.	S.	10,280	320 0	69 0	26 7	2	10,600 13,468 (*t*)	Sebastopol	1892	431,000	16	12	..	6 12-in. 56-ton, 7 6-in., 8 3·9-in. Q.F., 6 M.	7	16·5	700	500
a.g.b.	Gremiastchy	S.	1500	225 0	41 0	11 0	2	2500	St. Petersburg	1892	..	5	..	1½	1 9-in., 1 6-in., 10 Q.F.	2	15·0	100	142
a.c.	Gromoboi	S.	12,336	473 0	68 6	26 0	..	..	St. Petersburg (Baltic)	Bldg.	..	6	..	..	4 8-in. Q.F., 16 6-in., 6 4·7-in., 14 3-in., 20 1·8-in., 16 1·4-in., 2 l.	5	..	..	..
a.g.b.	Grozjastchy	S.	1492	229 0	41 8	11 0	2	2000	St. Petersburg	1890	..	5	..	1½	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120
„	Khrabry	S.	1492	229 0	41 8	11 0	2	2000	St. Petersburg (New Admiralty)	1895	..	5	..	1½	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120
c.b.	Kniaz Pojarski	I.	5138	272 4	49 3	23 11	1	2835	St. Petersburg	1867	..	4½	4½	..	2 8-in., 2 6-in., 10 Q.F. and M., 4 l.	..	11·0	600	452
t.	Kniaz Potemkine Tavritchesky, B.S.	S.	12,480	358 0	73 0	27 0	2	10,600	Nicolaieff	Bldg.	..	9	10	2½	4 12-in., 10 6-in. Q.F., 16 3-in., 16 1·8-in., 14 1·4-in., 2 l.	5	17·0	900†	636
c.d.s., br.	Kreml	I.	3480	219 10	52 5	15 0	1	2822	St. Petersburg	1864	..	4½	4½	..	8 8-in., 6 6-in., 5 Q.F., 6 l.	..	9·0	..	63
a.c.	Minin	I.	6136	298 6	49 3	25 3	1	6000	St. Petersburg	1878 altd.	..	7	8	..	4 8-in., 12 6-in., 16 Q.F., 4 l.	..	14·0	1200	450
c.d.s., br.	Netron-Menya	I.	3494	219 10	53 0	15 6	1	1600*	St. Petersburg	1864	..	4½	4½	..	14 8-in., 4 Q.F., 2 M., 4 l.	1	9·0	500	63
t.	Navarin	S.	10,206	338 0	67 0	25 0	2	9000	St. Petersburg	1891	772,995	16	12	..	4 12-in., 8 6-in., 14 Q.F., 4 l.	6	16·0	1200	..

* Lost near Viborg, June 24th, 1897. † And liquid fuel.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
t.	Nicolai I.	S. shd.	9672	326 0	67 0	23 0	2	8000	St. Petersburg	1888	453,000	14 *comp.*	10 tur. 6-in. b. *comp.*	2½	2 12-in. 52-ton, 4 9-in. 19-ton, 8 6-in., 12 Q.F., 8 M., 4 l.	6	14·8	..	604
cir. c.d.s.	Novgorod, B.S.	I. shd.	2706	101 0	101 0	13 0	6	2000	Nicolaieff	1873	..	9–7	9	..	2 11-in., 8 Q.F., 2 M., 2 l.	..	6·0	200	150
t.	Oslabya	S.	12,674	434 6	71 6	26 0	3	14,500	St. Petersburg (New Admiralty)	Bldg.	..	9½ H. S.	9 H. S.	2¾	4 10-in., 11 6-in. Q.F., 16 3-in., 10 1·8-in., 17 1·4-in., 2 l.	6	18·0	1063 2056	732
a.g.b.	Otvazny	S.	1500	225 0	41 0	11 0	2	2000 2589 (*t*)	St. Petersburg	1892	..	5	..	1½	1 9-in., 1 6-in., 10 Q.F.	2	15·0 15.5 (*t*)	100	142
a.c.	Pamyat Azova	S. shd.	6675	377 0	51 0	23 0	2	8000	St. Petersburg	1888	350,000	9 *comp.*	8 *comp.*	2½	2 8-in., 13 6-in., 14 Q.F., and 3 M.	7	18·8	1000	525
t.	Peresviet	S.	12,674	434 0	71 9	26 0	3	14,500	St. Petersburg	Bldg.	..	9½ H. S.	9 H. S.	2¾	4 10-in., 11 6-in. Q.F., 16 3-in., 10 1·8-in., 17 1·4-in., 2 l.	6	18·0	1063 2056	732
c.d.s., br.	Pervenetz	I.	3279	219 10	52 5	14 9	1	1067	Blackwall	1863	..	4½	4½	..	6 8-in., 9 6-in., 7 Q.F., 8 l.	..	9·0	..	63
t.	Peter Veliky	I.	9891	328 2	62 4	23 9	2	8258	St. Petersburg	1872	..	14–8	8–6	3	4 12-in. 40-ton, 13 Q.F., 4 l.	1	14·5	1200	436
t.	Petropavlovsk	S.	10,960	367 6	69 0	26 0	2	10600	St. Petersburg	1894	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5·9-in. Q.F., 34 smaller.	6	17 5	900	..
t.	Poltava	S.	10,960	367 6	69 0	26 0	2	10,600	St. Petersburg	1894	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5·9-in. Q.F., 34 smaller.	6	17·5	900	..
a. c.	Rossia	S.	12,130	480 0	68 6	25 0	3	14,500	St. Petersburg	1896	..	10	..	2½	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	5	20·0	2500	725
t.	Rostislav, B.S.	S.	8880	341 0	66 6	24 0	2	8,500	Nicolaieff	1896	..	15¾ *comp.*	15¾ *comp.*	2–3	4 10-in., 8 5·9-in. (Canet), 12 1·8-in. Q.F., 4 1·5-in., 2 M.	2–3	16·0	550 800	..
a. c.	Rurik	S.	10,923	396 6	67 0	26 0	2	13,250	St. Petersburg	1894	..	10 *comp.*	..	2½	4 8-in., 16 6-in., 6 4·7-in. Q.F., 18 small Q.F. & M.	5	18·0	2000	768
t.	Sevastopol	S.	10,960	367 6	69 0	26 0	2	13,600	St. Petersburg	1895	1,098,000	15¾	10 H. S.	3½	4 12-in., 12 5·9-in. Q.F., 34 smaller.	6	17·5	900	..

(*t*) On trial.

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
												Belt.	Gun Position	Deck Plating.	Guns. B.L.R. are of Russian Krupp pattern.	Torpedo Tubes.			
			tons.	ft. in.	ft. in.	ft. in.	no.				£	in.	in.	ins.			knots.	tons.	
b.	Sinope, B.S.	I. & S.	10,180	331 0	69 0	26 6	2	13000	Sebastopol	1887	900,000	16 *comp.*	14 *comp.*	3	6 12-in. 50-ton, 7 6-in., 8 Q.F., 6 M.	7	16·75	886	325
t.	Sissoi Veliky (Sissoi the Great)	S.	8880	341 0	66 6	24 0	2	8500	St. Petersburg	1894	796,333	15¾ *comp.*	15¾ *comp.*	3	4 12-in., 6 6-in. Q.F., 12 1·8-in., 4 1·4-in., 2 M.	6	16·0	550	..
b.	Tchesmé, B.S.	I. & S.	10,180	331 0	69 0	26 6	2	11000	Sebastopol	1886	900,000	16 *comp.*	14 *comp.*	3	6 12-in. 50 ton, 7 6-in., 8 Q.F., 6 M.	7	15·0	886	325
"	Tria Sviatitelia, B.S. (Three Saints.)	S.	12,480	357 6	72 2	27 0	2	10600	Nicolaieff	1893	..	18–16	16	3	4 12-in., 12 6-in. Q.F., 4 4-in., 4 7-in., 56 smaller Q.F. & M.	6 2 sub.	16·0 18·0 (*t*)	1000	582
circular c.d.s.	Vice-Admiral Popoff, B.S.	I. shd.	3590	120 0	120 0	13 5	6	3066	Nicolaieff	1875	..	16	16	..	2 12-in. 40-ton, 2 Q.F., 6 l.	..	8·0	250	453
a.c.	Vladimir Monomach	S. shd.	6061	296 6	52 0	24 0	2	7000	St. Petersburg	1882	..	6 *comp.*	..	2	5 8-in., 12 6-in., 18 Q.F. & M., 4 l.	2	15·2	400	550
"	Unnamed	S.	7800	..	..	..	..	..	La Seyne	Pro.	..	..	..	..	..	..	20 0	..	..

Ten old Monitors of 1566 tons have been removed from this list:—Uragan, Tifon, Streletz, Edinorog, Koldun, Lava, Bronenosetz, Latnik, Perun, and Vieschun; and one of 1461 tons—Smerch.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£		ins.			knots.	tons.	
to.g.b.	Abrek	S.	535	212	2	24	10	9	0	2	4506 (*t.*)	Abo	1896	*53,600	..	½	.. ..	2	21·2 (*t.*)	..	..
2nd cl. *cr.*	Admiral Korniloff	S.& W.	5000	351	0	48	6	20	0	2	9000	St. Nazaire	1887 1895	296,000	..	2½	2 8-in., 14 6-in., 6 1·8-in. Q.F., 6 1·4-in., 5 l.	6	17·5	1100	425
3rd cl. *cr.*	Afrika	I.	2590	285	5	39	4	17	1	1	1350	Chester, U.S.	1877	..	..	..	3 6-in., 6 Q.F., 4 M., 4 l.	..	13·0	975	257
3rd cl. *cr.*	Asia	I.	2500	269	0	36	0	16	5	1	1100	Philadelphia	1878	..	..	..	2 6-in., 5 Q.F., 6 M., 5 l.	..	13·0	750	260
cr.	Aurora	S.	6630	413	4	55	9	21	0	3	11610	St. Petersburg (Franco-Russian)	Bldg.	..	..	2½	6 5·9-in. Q.F., 6 4·7-in., 27 smaller.	4	20·0	..	..
to.g.b.	Bakan†	S. shd.	240	180	6	15	7	11	6	2	3800	St. Petersburg (Baltic)	1896	..	..	..	.. ..	..	..	..	..
g.v.	Bobr	S.	950	187	0	35	2	9	6	2	1150	Kretona	1884	43,000	..	..	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	12·0	..	..
to.g.b.	Captain Sacken, B.S.	S.	742	210	0	24	0	8	10	2	3400	Nicolaieff	1888	40,700	..	..	7 4·7-in. Q.F., 7 M.	6	18·5	97	120
g.v.	Chernomoretz, B.S.	S.	1224	210	0	35	0	11	1	1	2000	Nicolaieff	1889	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161
„	Coreetz	S.	1213	206	0	35	0	10	6	2	1500	Stockholm	1886	..	..	1½	2 8-in., 1 6-in., 2 Q.F., 4 l.	2	13·5	..	..
cr.	Diana	S.	630	413	4	55	9	21	0	3	11610	St. Petersburg (New Admiralty)	Bldg.	..	..	2½	6 5·9-in. Q.F., 6 4·7-in., 27 smaller.	4	20·0	..	..
corv.	Djigit	I. & W.	1456	206	9	32	10	16	1	1	1700	St. Petersburg	1876	..	..	..	3 6-in., 8 Q.F. & M., & 4 l.	..	13·0	250	172
„	Donetz, B.S.	S.	1224	210	0	35	0	11	0	1	2000	Nicolaieff	1887	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161
to.g.b.	Gaidamak	S.	500	192	6	24	2	7	6	2	3000	Abo	1893	..	..	..	2 1·8-in. Q.F., 7 1·4-in., 10 M.	3	22·0	90	87
g.v.	Gilyak	S.	963	200	0	37	0	..		..	1000	St. Petersburg (New Admiralty)	1897	..	..	..	1 4·7-in. Q.F., 5 3-in., 2 2·6-in., 4 1·8-in.	2	12·0	..	..
to.g.b.	Griden, B.S.	S.	400	192	6	24	2	7	6	2	3500	Nicolaieff	1893	66,600	..	..	2 1·8-in. Q.F., 7 1·4-in., 10 M.	3	22·0	90	60
g.v.	Jermak	I.	706	154	3	26	3	11	2	1	125	St. Petersburg	1870	..	..	..	2 guns	..	..	..	..
to.g.b.	Kazarsky, B.S.	S.	400	190	0	24	0	8	6	2	3500	Elbing	1890	32,500	..	..	9 1·8-in. Q.F. (Hotchkiss)	2	23·0	90	60
corv.	Kreisser	I. & W.	1653	206	9	32	10	16	1	1	1800	St. Petersburg	1875	..	..	..	2 6-in., 7 Q.F., 1 M., 4 l.	..	13·0	..	..
g.v.	Kubanetz, B.S.	S.	1224	210	0	35	0	11	0	1	1500	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F.	2	13·8	250	161
to.g.b.	Lieutenant Ilyin	S.	714	230	0	24	0	8	10	2	3500	St. Petersburg	1887	40,150	..	..	7 3-pr. Q.F., 10 M.	7	20·1	97	120

* Including armament. † Particulars doubtful.

RUSSIA.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	No.				£	in.	in.			knots.	tons.	
g.v.	Mandjur	S.	1416	210	0	35	0	11	0	2	1400	Copenhagen	1886	..	..	1½	2 8-in., 1 6-in., 7 Q.F., M., & 4 l.	2	14·0	..	..
corv.	Nayezdnik	I. & W.	1334	206	9	32	10	14	0	1	1719	St. Petersburg	1878	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	250	172
corv.	Oprichnik	S. & W.	1426	206	9	32	10	14	0	1	1268	St. Petersburg	1880	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	230	172
cr.	Pallada	S.	6630	413	4	55	8	21	0	3	11610	St. Petersburg (New Admiralty)	Bldg.	..	..	2½	6 5·9-in. Q.F., 6 4·7-in., 27 smaller	4	20·0	..	..
2nd cl. *cr.*	Pamyat Merkuriya, B.S.	I. & S.	3050	295	0	41	0	17	0	1	3000	Toulon	1880	..	..	..	6 6-in., 8 Q.F. & M., 4 l.	2	16·0	1100	200
sl.	Plastun	I. & W.	1255	206	9	32	10	14	0	1	1268	St. Petersburg	1879	..	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	Posadnik	S.	462	192	6	24	2	7	6	2	3600	Elbing	1892	111,000	..	..	2 1·8-in. Q.F., 7 1·4-in., 3 M.	3	22·0	90	87
corv.	Razboynik	I. & W.	1329	206	9	32	10	14	0	1	1786	St. Petersburg	1878	125,000	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
3rd cl. *cr.*	Rynda	S. shd.	3508	265	9	45	11	16	1	2	3000	St. Petersburg	1885	..	..	1½	10 6-in., 9 Q.F., M., & 4 l.	4	14·8	710	322
g.v.	Sivootch	S.	950	187	0	35	0	9	6	2	1125	Stockholm	1884	43,000	..	..	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	12·5	..	..
corv.	Strjelok	I. & W.	1343	206	9	32	10	14	0	1	1528	St. Petersburg	1880	..	..	..	3 6-in., 7 Q.F., M., & 4 l.	..	13·0	250	172
cr.	Svietlana	S.	3828	331	3	42	8	18	9	2	3828	Havre	1896	..	4	2	6 5·9 Q.F. (Canet), 10 1·8-in.	4	20·2 (*t.*)	1000	..
g.v.	Teretz, B.S.	S.	1224	210	0	35	0	11	0	..	1500	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·8	250	161
”	Uraletz, B.S.	S.	1224	210	0	35	0	11	0	..	1500	Sebastopol	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·8	250	161
to.g.b.	Voevoda	S.	400	192	6	24	2	7	6	2	3600	Elbing	1892	111,000	..	..	2 1·8-in. Q.F., 7 1·4-in., 3 M.	3	22·0	90	87
sl.	Vjestnik	I. & W.	1255	206	9	32	10	14	2	1	1268	St. Petersburg	1879	..	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	Vzadnik	S.	400	192	6	24	2	7	6	2	3000	Abo	1893	..	..	..	4 1 8-in. Q.F., 7 1·4-in. 10 M. & 1.	3	22·0	250	172
sl.	Zabiyaka	I.	1234	219	10	29	6	14	9	1	1194	Philadelphia	1878	..	..	..	6 Q.F., 4 M., 5 l.	..	14·5	90	87
g.v.	Zaporojetz	S.	1224	210	0	35	0	10	0	2	1500	Nicolaieff	1887	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5	250	161

Baltic :—*Ten Gunboats, Staunch Class*, of 270 to 402 tons, 195 to 445 I.H.P., with 1 11-inch breech-loader, and 9 knots speed, and *two Gunboats* of about 180 tons and 7 knots speed. *Training Ships*, Bajan, Voin, Vierny (launched at the Baltic Works, St. Petersburg, November, 1895), and Moriak. Black Sea :—*Twelve Steamers (Gun-vessels, Despatch-vessels, &c.)* 90 to 298 tons. *Imperial Yachts*, Standart, Polarnaia Svezda, Tsarevna, &c.

Auxiliary Steamers.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Complement.
	BLACK SEA CO.		tons.	ft. in.	ft. in.	ft. in.					
Auxiliary Cruiser	Czar	S.	2340	319 0	37 0	23 6	1	350 nom.	Newcastle	1883	14
,,	Czarevna	,,	2340	319 0	37 0	23 6	1	350 nom.	,,	1883	14
,,	Czaritza	,,	2340	319 0	37 0	23 6	1	350 nom.	,,	1883	14
,,	Grand Duke Alexis	,,	2350	284 0	37 0	14 9	1	3500	Hebburn	1890	16
,,	Grand Duke Constantine	,,	2400	284 0	37 0	15 0	1	3500	,,	1891	16
,,	Grand Duke No. 1	,,	2400	288 0	37 0	15 0	1	2500	,,	Bldg.	14½
,,	Grand Duke No. 2	,,	2400	288 0	37 0	15 0	1	2500	,,	,,	14½
,,	Emperor Nicolas II.	,,	..	..	..	..	..	..	,,	1895	..
,,	Roumantzeff	,,	760	212 0	28 0	7 6	2	1000	,,	1894	13
	VOLUNTEER FLEET.										
,,	Ekaterinoslav	,,	10,500	440 0	49 6	24 0	2	3200	,,	1896	12
,,	Khabarovsk	I.	2700	265 0	36 0	14 6	2	1800	,,	1894	13
,,	Kherson†	S.	10,225	493 0	54 3	24 0	2	{12,500 / 13,150 (t.)*}	,,	1895	19½
,,	Kiev	,,	10,500	440 0	49 6	24 0	2	3200	Clydebank	1895	13
,,	Kostroma	I.	7975	360 0	42 0	23 6	1	2700	Hebburn	1888	14
,,	Moskva †	S.	11,700	508 0	58 0	25 0	2	12,500	Clydebank	Bldg	20
,,	Nijni Novgorod	I.	7876	325 0	40 0	23 6	1	2000	Elswick	1891	11½
,,	Orel	,,	7990	445 0	48 0	23 6	2	10,000	Hebburn	1889	19
,,	Petersburg	,,	9252	460 0	52 0	24 0	2	11,000	,,	1894	19
,,	Poltava	S.	10,225	493 0	54 3	24 0	2	12,500	Dumbarton	Bldg.	19½
,,	Saratoff	,,	8556	462 0	50 0	24 0	2	10,000	Glasgow	1892	19
,,	Tamboff	,,	8640	385 0	45 0	24 6	1	2,500	Dumbarton	1893	12¾
,,	Vladimir	,,	10,500	440 0	49 6	24 0	2	3,200	,,	1895	12
,,	Voronej	,,	10,500	440 0	49 6	24 0	2	3,200	,,	1895	12
,,	Yaroslav	,,	8640	385 0	45 0	24 6	1	2,500	,,	1893	12¾

* Belleville boilers supplied by Maudslay. † Armament, 3 4·7-in. Q.F., 20 smaller; Belleville boilers constructed at Clydebank. Three other ships of 10,000 tons, 20 knots, in hand.

SPAIN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Belt.	Armour. Gun Position	Armour. Deck Plating.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	in.	ins.	ins.			knots.	tons.	
a.c.b.	Almirante Oquendo .	S.	7000	340	0	65	0	21	6	2	13,000	Bilbao .	1891	600,000	12	10½	3	2 11-in., 10 5·5-in. (all Hontoria), 8 2·2-in. Q.F., 8 1·4-in., 2 M.	6	20·0	1200	500
,,	Cardenal Cisneros .	S.	7000	347	10	61	0	21	10	2	15,000	Ferrol . .	1896	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	8	20·0	1200	500
,,	Cataluña . . .	S.	7000	347	10	61	0	21	10	2	15,000	Carthagena .	Bldg.	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	8	20·0	1200	484
a.c.	Cristobal Colon (ex Giuseppe Garibaldi II.)	S.	6840	328	0	59	8	24	0	2	14,000	Sestri Ponente	1896	..	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.	4	20·0	600 1000	450
a.c.t.	Emperador Carlos V.	S.	9235	380	0	67	0	25	0	2	18,500	Cadiz (Vea Murguia)	1895	734,000	2	10	6⅓	2 11-in. (Hontoria), 8 5·5-in. Q.F., 4 3·9-in., 2 2·7-in., 4 2·2-in., 6 M.	6	20·0	1200	535
a.c.b.	Infanta Maria Teresa	S.	7000	340	0	65	0	21	6	2	13,758	Bilbao .	1890	600,000	12	10½	3	2 11-in., 10 5·5-in. (all Hontoria), 8 2·2-in. Q.F., 8 1·4-in., 2 M.	6	20·25	1200	500
br.	Numancia * . .	I.	7305	314	10	55	9	25	3	1	3708	La Seyne .	1863 1897	315,600	5½	5	..	8 10-in. M.L.R. (Armstrong), 6 6·2-in. Q.F., 6 4·7 in. (Hontoria), 8 M., 3 l.	2	8·0	1100	600
b.	Pelayo * . . .	S.	9900	330	0	66	0	24	11	2	9000	La Seyne .	1887 1897	..	17¾	19¼	4	2 12-5-in. 48 ton, 2 11-in. 38-ton, 9 5·5-in. Q.F., 6 smaller, 12 M.	7	16·0	800	600
a.c.	Pedro d'Aragon .	S.	6840	328	0	59	8	24	0	2	13,000	Sestri Ponente	Bldg.	..	6 H.S.	6 H.S.	1½	2 10-in., 10 6-in. Q.F., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.	4	20·0	1000	450
a.c.b.	Princesa de Asturias	S.	7000	347	10	61	0	21	10	2	15,000	Carraca .	1896	600,000	12	10½	2	2 11-in., 10 5·5-in. Q.F., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	8	20·0	1200	500
c.s., t.	Puig-cerda . (Monitor) (torpedo training)	I.	553	127	11	29	6	6	7	2	328	La Seyne .	1874	..	4	4	9	1 6·2-in. (Palliser), 2 4·7-in. bronze smooth bores.	..	8·0	23	..
a.c.b.	Vizcaya . . .	..	7000	340	0	65	0	21	6	2	13,000	Bilbao .	1891	600,000	12	10½	3	2 11-in., 10 5.5-in. Q.F., 2 2·7-in., 8 12·2-in., 4 1·4-in. 2 M.	6	20·0 21·0 (*t*)	1200	500
br.	Vitoria (training) † .	I.	7250	318	3	55	10	25	3	1	4500	Blackwall .	1865	..	5½	5	..	8 9-in. M.L.R. (Armstrong), 3 8-in., 1 7·8-in. (Hontoria), 8 M., 2 l.	2	11·0	875	561

* New armament given: Pelayo, Niclausse boilers. † Being furnished with fighting-masts and 5·5-in. Q.-F. guns at La Seyne.

A battleship of 11,000 tons is projected. It is stated (March, 1898) that the armoured cruiser Varese (6,840 tons), completing at Leghorn, has been bought from the Italian Government.

SPAIN.—Cruising Ships.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£		ins.			knots.	tons.	
cr.	Alfonso XII.	S.	3090	278	10	42	7	16	5	1	4800	Ferrol	1887	..	..	..	6 6·2-in. (Hontoria), 2 2·7-in. 6 6-pr. Q.F., 4 3-pr., 5 M.	5	17·5	600	300
"	Alfonso XIII.	S.	5000	318	6	50	6	20	0	2	11,000	Ferrol	1891	..	..	4½	4 7·8-in. (Hontoria), 6 4·7-in., 6 2·2-in. Q.F., 6 1·4-in., 3 M.	5	20·0	1200	276
"	Aragon	W.	3342	246	0	45	11	20	11	1	4400	Carthagena	1879	..	..	..	6 6·2-in. (Hontoria), 2 3·3-in. (Krupp), 4 2·9-in., 2 M.	2	14·0	470	300
"	Castilla	W.	3342	246	0	45	11	20	11	1	4400	Cadiz	1881	..	..	..	4 5·9-in. (Krupp), 2 4·7-in., 2 3·3-in., 4 2·9-in., 8 Q.F., 2 M.	2	14·0	470	300
g.b.	General Concha	I.	524	157	5	25	7	8	7	2	600	Ferrol	1883	..	..	..	3 4·7-in. (Hontoria), 2 Q.F., 1 M.	1	11·5	80	93
cr.	Conde de Venadito	I.	1130	210	0	32	0	12	6	1	1600	Carthagena	1888	..	..	..	4 4·7-in. (Hontoria), 2 2·7-in., 2 Q.F., 5 M.	2	14·0	220	130
to.g.b.	Don Alvaro de Bazan	S.	823	233	0	26	9	22	0	2	4600	Ferrol	1897	..	..	..	2 4·7-in. (Hontoria) Q.F., 4 1·6-in., 2 M.	4	20 0	..	110
cr.	Don Antonio de Ulloa	I.	1130	210	0	32	0	12	6	1	1600	Cadiz	1887	..	..	..	4 4·7-in. (Hontoria), 2 2·7-in., 2 Q.F., 5 M.	2	14·0	210	130
"	Don Juan de Austria	I.	1130	210	0	32	0	12	6	1	1600	Carthagena	1887	..	..	..	4 4·7-in. (Hontoria), 3 2·2-in. Q.F., 2 1·5-in., 5 M.	3	14·0	210	130
to. g. b.	Doña Maria de Molina	S.	823	233	0	26	9	22	0	2	4600	Ferrol	1896	..	..	..	2 4·7-in. (Hontoria), Q.F., 4 1·6-in., 2 M.	4	20 0	..	110
to.g.b.	Destructor	S.	458	192	6	25	0	7	0	2	3800	Clydebank	1887	..	..	..	1 3·5-in., 4 6-pr. Q.F., 4 M.	3	22·56	104	55

SPAIN.—Cruising Ships—*continued*.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			metric tons.	ft. in.	ft. in.	ft. in.	no.				£	ins.	ins.			knots.	tons.	
g.v.	Elcano	I.	524	157 5	25 7	8 6	2	600	Carraca	1885	..	..	..	3 4·7-in. (Hontoria), 2 Q.F., 2 M.	1	11·5	80	116
d.v.	Fernando el Catolico (Torpedo training)	I.	500	157 5	25 7	8 5	2	550	La Seyne	1875	..	..	..	1 6·2-in. M.L.R. (Palliser), 2 4·7-in., smooth-bores, 1 M.	..	10·0	20	98
to.g.b.	Filipinas	S.	750	213 0	27 0	8 6	2	4600	Cadiz	1892	..	..	..	2 4·7-in. Q.F., 4 1·5-in., 4 M.	4 sub.	20·0	120	110
,,	Galicia	S.	571	190 0	23 0	10 4	2	2600	Le Graña	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80
g. v.	General Lezo	I.	524	157 5	25 7	8 6	2	600	Cathagena	1885	..	..	..	2 4·7-in. (Hontoria), 1 3·5-in., 2 Q.F., 1 M.	2	11·0	80	97
cr.	Infanta Isabel	I.	1130	210 11	32 2	12 5	1	1500	Cadiz	1885	..	..	..	4 4·7-in. (Hontoria), 2 2·7-in., 3 Q.F., 4 M.	2	14·0	220	130
,,	Isabel II.	I.	1130	210 11	32 2	12 5	1	1500	Ferrol	1886	..	..	..	4 4·7-in. (Hontoria), 2 7·7-in., 4 Q.F., 3 M.	2	14·0	220	130
,,	Isabel la Catolica	S.	3500	..	..	..	..	..	Carraca	Bldg.	..	..	..	.. .. ..	..	..	..	..
,,	Isla de Cuba	S.	1030	185 0	30 0	11 6	2	2200	Elswick	1887	..	..	2½	4 4·7-in. (Hontoria), 4 6-pr. Q.F., 2 3-pr, 2 M.	3	16·0	160	160
sl.	Isla de Luzon	S.	1030	185 0	30 0	11 6	2	2200	Elswick	1887	..	..	2½	4 4·7-in. (Hontoria), 46-pr. Q.F., 2 3-pr., 2 M.	3	16·0	160	160
,,	Jorge Juan	W.	935	203 5	29 6	12 2	1	1100	La Seyne	1876	..	..	..	3 4·7-in. (Hontoria), 2 2·8-in. (Krupp), 2 M.	..	13·0	130	146
cr.	Lepanto	S.	4826	318 6	50 6	20 0	2	12,000	Carthagena	1892	..	..	4¾	4 7·8-in. (Hontoria), 6 4·7-in. Q.F., 6 6-pr., 4 3-pr. 5 M.	5	20·0	1100	276
g.v.	Magellanes	I.	524	157 5	25 7	8 6	2	600	Cadiz	1885	..	..	..	3 4·7-in. (Hontoria), 3 M.	1	11·0	80	97
to.g.b.	Marques de la Victoria	S.	823	233 0	26 9	22 0	2	4600	Ferrol	1897	..	..	..	2 4·7-in. (Hontoria) Q.F., 4 1·6-in., 2 M.	4	20·0	..	110
cr.	Marques de la Ensenada	S.	1030	185 0	30 0	11 6	2	1600	Carraca	1890	..	..	2½	4 4·7-in. (Hontoria), 5 Q.F., 4 M.	4	15·0	160	164
d.v.	Marques del Duero	I.	500	157 5	25 7	8 5	2	550	La Seyne	1875	..	..	..	1 6·2-in. M.L.R. (Palliser), 2 4·7-in. smooth-bores, 1 M.	..	10·0	90	98
to.g.b.	Marques de Molins	S.	571	190 0	23 0	10 4	2	2600	La Graña	1891	..	..	..	2 4·7in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80
,,	Martin Alonzo Pinzon	S.	571	190 0	23 0	10 4	2	2600	La Graña	1892	..							
cr.	Navarra	W.	3342	232 11	42 7	20 4	1	4400	Ferrol	1881	..	..	..	4 5·9-in., 2 4·7-in., 2 3·4-in., 4 2·9-in., 4 M.	2	14·0	470	300
,,	Nueva Espana	S.	630	190 0	23 0	11 9	2	2600	Carraca	1889	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	18·0	106	91
,,	Quiros	S.	315	155 0	23 0	11 0	..	500	Hong Kong	1895	..	..	..	2 2·2-in. Q.F., 2 M.	..	11·5	..	..
to.g.b.	Rapido	S.	570	190 0	23 0	10 4	2	2600	Carraca	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	18·0	106	80
cr.	Reina Christina	S.	3520	282 2	42 7	16 5	1	3970	Ferrol	1886	..	..	..	6 6·2-in. (Hontoria), 2 2·7-in., 3 2·2-in. Q.F., 2 1·5-in., 6 3-pr., 2 M.	5	17·5	600	370
,,	Reina Regente	S.	5000	..	..	..	..	..	Ferrol	Bldg.	..	..	..	..	..	20·0	..	..
,,	Reina Mercedes	S.	3090	278 10	42 7	16 5	1	3700	Carthagena	1887	..	..	..	6 6·2-in. (Hontoria), 2 2·7-in., 3 2·2-in. Q.F., 2 1·5.in., 6 1·4-in., 2 M.	5	17·5	600	375
,,	Rio de la Plata	S. shd.	1800	246 0	35 4	15 0	2	7100	Havre	Bldg.	..	..	1	2 5·5-in. Q.F., 4 3·9-in., 4 2·2-in., 6 M.	2	20·0	270	..
to.g.b.	Temerario	S.	570	190 0	23 0	10 4	2	2600	..	1889	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	20·5	106	82
cr.	Velasco	I.	1152	209 11	29 3	12 5	1	1500	Blackwall	1881	..	..	..	3 5·9-in. 4-ton (Armstrong), 2 2·7-in. (Hontoria), 2 M.	..	14·3	220	173
to.g.b.	Veloz	S.	750	213 0	27 0	8 6	2	4500	..	Bldg.	..	..	..	2 5·9-in. (Hontoria), 4 2·2-in. Q.F., 4 M.	2	20·0	106	..
,,	Vincente Yanez Pinzon	S.	571	190 0	23 0	10 4	2	2600	La Graña	1891	..	..	..	2 4·7-in. (Hontoria), 4 2·2-in. Q.F., 1 M.	2	19·0	106	80
,,	Villalobos	S.	315	155 0	23 0	11 0	..	500	Hong Kong	1896	..	..	..	2 2·2-in. Q.F., 2 M.	..	11·5	..	..

Seven 1st class Gunboats, Hernan Cortez, Pizzaro, Vasco Nuñez de Balboa, Ponce de Leon, Velasquez, Alvarado, and Sandoval (300 tons), built for Cuba, 1895. Quiros, 347 tons, launched 1895, and Villalobos (1896) for the Philippines. Twenty-three 2nd class Gunboats, 103 to 255 tons. Forty-one 3rd class Gunboats, of which eighteen built for Cuba, 1895.

SWEDEN.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply.	Complement.
															Belt.	Gun Position.	Back-ing. Deck Plating.	Guns.	Torpedo Tubes.			
			metric tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
a.g.b.	Berserk . .	I.	452	131	3	29	6	8	3	2	155	Norköping .	1874	..	2½	14	¾	1 9·4-in., 2 M.	..	8·0	19	45
”	Björn . .	I.	457	131	3	26	3	8	3	2	155	Norköping .	1874	..	2½	14	¾	1 9·4-in., 2 M.	..	8·0	19	45
”	Fenris . .	I.	259	104	11	22	4	7	10	1	44	Stockholm .	1872	..	2	11	¾	1 9·4-in., 2 M.	..	6·0	7	30
”	Folke . .	I.	460	131	3	26	3	8	3	2	155	Norköping .	1875	..	2½	14	¾	1 9·4-in., 2 M.	..	8·0	19	45
”	Gerda . .	I.	457	131	3	26	3	8	3	2	133	Stockholm .	1873	..	2½	14	¾	1 9·4-in., 2 M.	..	8·0	19	45
c.d.s., t.	Göta . .	S.	3135	258	6	48	0	16	0	2	4677	Gothenburg .	1890	..	11½	11½–9¾	2	2 10-in., 4 6-in., 5 Q.F., 6 M. .	3	15·96	200	150
a.g.b.	Hildur . .	I.	457	131	3	26	3	8	3	2	133	Stockholm .	1872	..	2½	14	¾	1 9·4-in., 2 M.	..	8·0	19	45
c.d.s., t.	John Ericsson .	I.	1500	200	2	45	11	11	6	1	380	Norköping .	1865	..	4½	11½	1	2 9·4-in., 2 M.	..	6·0	112	80
”	Loke . .	I.	1600	205	3	45	11	11	10	1	430	Norköping .	1871	..	4½	18	1	2 9·4-in., 2 M.	..	7·0	112	75
”	Njord . .	S.	3300	270	4	47	10	16	6	2	3700	Gothenburg .	Bldg.	..	9·5	..	..	2 9·8-in., 6 4·7-in. Q.F., 10 2·2-in., 4 M.	1	16·0	300	200
”	Odin . .	S.	3300	270	4	47	10	16	6	2	3700	Stockholm .	1896	..	9·5	..	.. 2	2 9·8-in., 6 4·7-in. Q.F., 10 2·2-in., 4 M.	1	16·0	300	200
a.g.b.	Sköld . .	I.	247	104	11	22	4	8	3	1	17	Stockholm .	1869	..	1	9	¾	1 9·4-in., 2 M.	..	4·0	5	39
”	Sölve . .	I.	454	131	3	29	6	8	3	2	155	Norköping .	1875	..	2½	14	¾	1 9 4-in., 2 M.	..	8·0	19	45
c.d.s., t.	Svea . .	S.	2900	249	4	49	3	15	9	2	3100	Gothenburg .	1886	127,300	11½	11½	2	2 10-in. (Armstrong), 4 6-in., 4 l., 6 M.	3	15·45	200	268
”	Thor . . .	S.	3300	270	4	47	10	16	6	2	3700	Stockholm .	Bldg.	..	9·5	..	..	2 9·8-in., 6 4 7-in. Q.F., 10 2·2-in., 4 M.	1	16·0	300	200
t.	Thordön . .	I.	1500	200	2	45	11	11	6	1	380	Norköping .	1866	..	4½	11½	1	2 9·4-in., 2 M.	..	6·0	112	80
c.d.s., t.	Thule . .	S.	3150	249	4	49	3	15	9	2	4750	Stockholm .	1892	..	11½–7¾	11½	2	2 10-in. (Armstrong), 4 6-in., 5 l., 6 M.	3	16·0	..	165
”	Tirfing . .	I.	1500	200	2	45	11	11	6	1	380	Norköping .	1867	..	4½	11½	1	2 9·4-in., 2 M.	..	6·0	112	80
a.g.b.	Ulf . . .	I.	457	131	3	26	3	8	3	2	155	Norköping .	1873	18,000	2½	14	¾	1 4·7-in. Q.F., 2 2·2-in. . .	..	8·0	20	45

SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
															Gun Position.	Deck.	Guns.	Torpedo Tubes.			
			Metric tons.	ft.	in.	ft.	in.	ft.	in.	no.									knots.	tons.	
corv.	Balder . . .	W.	1886	203	5	36	0	18	4	1	1380	Carlskrona .	1870	..	..	..	2 6-in. (Armstrong), 6 4·7-in., 2 l., 4 M.	..	12·0	200	218
g.v.	Blenda . . .	I.	500	167	4	25	11	9	2	2	590	Gothenburg .	1875	..	..	..	1 10·6-in., 1 4·7-in., 2 M. .	..	12·0	98	71
„	Disa	I.	500	167	4	25	11	9	2	2	590	Carlskrona .	1877	..	..	..	1 6-in., 1 4·7-in., 2 l., 2 M. .	..	12·0	98	72
tor. ship.	Drott (ex Ran) . .	I.	630	173	10	26	3	9	6	2	960	Stockholm .	1877	..	..	..	4 Engström, Q.F. . . .	3	13·0	100	..
g.v.	Edda	I.	640	180	5	27	3	9	6	2	960	Carlskrona .	1882	..	..	..	1 10·6-in., 1 6-in., 2 l., 2 M. .	..	13·0	80	76
corv.	Freja	S.& W.	2000	216	6	39	4	18	9	1	1750	Malmö . .	1885	..	..	..	5 6-in., 8 5-in., 4 l., 4 l. . .	..	12·0	180	250
to.g.b.	Eldern . .	S.	670	223	0	27	6	8	9	1	4000	Elbing .	1896	..	..	..	2 4·7-in. Q.F., 4 2·2-in. . .	1	19·0	..	..
„	Järnan . .												1897								
„	Örn . . .												1897								
g.v.	Rota	I.	537	170	7	26	3	9	2	2	780	Stockholm .	1878	..	..	..	1 10 6-in., 1 4·7-in., 2 M. .	..	13·0	80	72
corv.	Saga	W.	1535	200	2	32	10	17	1	1	900	Carlskrona .	1878	..	..	..	1 6-in. (Armstrong), 6 4·7-in., 4 M., 2 l.	..	11·0	170	189
g.v.	Skäggald . . .	I.	537	170	7	26	3	9	2	2	780	Stockholm .	1879	..	..	..	1 6-in., 1 5-in., 2 M. . .	..	13·0	80	72
„	Skagul . . .	I.	537	170	7	26	3	9	2	2	780	Stockholm .	1878	..	..	..	1 6-in., 1 5-in., 2 M. . .	..	13·0	80	72
„	Skuld	I.	537	170	7	26	3	9	2	2	780	Carlskrona .	1880	..	..	..	1 6-in., 1 5-in., 2 M. . .	..	13·0	80	72
„	Urd	I.	537	170	7	26	3	9	2	2	780	Malmö . .	1877	..	..	..	1 6-in., 1 5-in., 2 Q.F., 2 M. .	..	13·0	80	71
„	Verdande . . .	I.	537	170	7	26	3	9	2	2	780	Carlskrona .	1879	..	..	..	1 6-in., 1 5-in., 2 M. . .	..	13·0	80	72

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in B.L.R. and 2 M.; also one gunboat of 280 tons and 440 H.P., armed with 4 quick-firing guns.

TURKEY.—Armoured Ships.

A number of ships have been struck out of these lists owing to information obtained from Constantinople. Of the remainder few have any fighting value.

Class.	NAME.	Material.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal Coal Supply	Complement.
															Belt.	Gun Position	Deck.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	no.					inches.	inches.	inches.			knots.	tons.	
c.b.	Avni-Illah . .	I.	2400	226	4	36	0	16	5	1	2200	Thames	1869	..	6	6	1½	4 9-in. M.L.R. (Armstrong), 4 M., 4 l. .	1	12·0	220	225
b.	Azizieh (*a*) . .	I.	6400	292	0	55	9	25	7	1	3735	Clyde .	1864	..	5½	4½	..	2 9·4-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	13·0	750	600
c.b.	Feth-i-Bulend .	I.	2806	236	3	39	4	18	1	1	3250	Thames .	1869	..	9	9	5	4 9-in. M.L.R. (Armstrong), 4 M., 4 l. .	1	13·0	300	250
a.g.b.	Feth-el-Islam .	I.	335	101	9	24	7	5	11	1	290	Gironde .	1864	..	3	3	..	2 7-in. (Armstrong), 2 l.	..	8·0	20	..
c.b.	Hamidieh . .	I.	6700	292	0	55	9	24	10	1	4500	Turkey	1885	..	9	5	3	10 10·2-in. (Krupp), 2 6·6-in., 6 l., 2 M.	2	13·0	600	..
b.	Mahmudieh . .	I.	6400	292	0	55	9	25	7	1	3735	Thames .	1864	..	5½	4½	..	2 9·4-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600
c.b.	Mesoodieh . .	I.	9120	331	5	59	0	25	11	1	7431	Thames .	1874	..	12	9	1	12 10-in. M.L.R. (Armstrong), 3 5·9-in. (Krupp), 7 M., 6 l.	..	13·0	600	..
”	Muin-i-Zaffer .	I.	2400	230	0	36	0	16	5	2	2200	Thames .	1869	..	6	6	1½	4 10-in. M.L.R. (Armstrong), 1 4·7-in. (Krupp), 4 M., 4 l.	1	12·0	220	..
”	Mukadim-i-Hair .	I.	2806	236	3	39	4	18	1	1	3000	Turkey .	1872	..	9	9	5	4 10-in. M.L.R. (Armstrong), 1 4·7-in. (Krupp), 4 M., 4 l.	1	12·0	300	250
”	Nedjim-i-Schefhet	I.	2050	203	5	42	7	16	5	2	1900	La Seyne .	1868	..	6	5	..	1 9-in., 4 7-in. (Armstrong), 4 M., 4 l. .	1	11·0	300	220
b.	Orkanieh . .	I.	6400	292	0	55	9	25	7	1	3735	Clyde .	1865	..	5½	4½	..	2 9·4-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600
”	Osmanieh (*a*) .	I.	6400	292	0	55	9	25	7	1	3735	Clyde .	1864	..	5½	4½	..	2 9·4-in. (Krupp), 8 8·2-in., 6 3·9-in., 7 M., 2 l.	2	12·0	750	600

(*a*) These ships are cut down forward and aft, and a barbette fitted at each end.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-power.	Where Built.	Cost.	Date of Launch.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft. in.	ft. in.	ft. in.				£		in.	in.			knots.	tons.	
cr.	Fezibahri	S.	1815	226 0	35 0	14 0	2	2500	Turkey	..	Bldg.	..	½	6 6-in. (Krupp)	7	17·0	..	..
"	Heibetnuma	S. & W.	1960	226 0	37 0	14 0	1	2500 ind.	Turkey	..	1890	..	..	3 6·6-in. (Krupp), 6 4·7-in., 6 Q.F.	2	14·0	..	..
"	Hundavendikiar	S.	4050	279 0	49 3	21 0	2	..	Turkey	..	Bldg.	..	2	2 8·9-in. (Krupp), 6 5·9-in., 4 3·9-in.	5	..	..	300
g.v.	Lutfi-hamayoun	C.	1313	210 0	35 0	14 0	1	2800	Turkey	..	1892	..	..	4 6-in. (Krupp), 6 4·7-in. 6 Q.F.	2	13·0	..	..
to. g.b.	Namet	S.	900	230 0	31 0	16 6	2	4500	Gaarden	..	1890	¼	..	2 4-in. (Krupp), 16 M.	2	19·0	..	111
"	Pelenk-i-deria	S.	840	236 3	31 0	16 6	2	5000	Gaarden	..	1890	¼	..	2 4-in. (Krupp), 16 M.	2	20·0	..	111
g.v.	Sedul Bahr	W.	800	173 6	26 7	11 6	1	160	Turkey	..	1894	..	2	4 4·7-in. (Krupp), 6 M.	2	12·7	120	..
cr.	Selimieh	S.	4050	279 0	49 3	21 0	2	..	Turkey	..	Bldg.	..	½	2 8·2-in. (Krupp), 6 5·9-in., 4-in., 6 M.	..	..	..	300
"	Shadie	S.	1815	226 0	35 0	14 0	2	2500	Turkey	..	Bldg.	..	..	6 5·9-in. (Krupp)	7	17·0	..	..
to. g.b.	Shahani-deria	S.	450	200 0	23 0	9 0	2	3000	Turkey	..	1892	..	..	2 4·7-in. Q.F. (Krupp), 6 M.	4	22·0	..	..
"	New vessel (Y)	S.	900	230 0	31 0	16 6	2	4500	Gaarden	..	Bldg.	¼	..	2 4-in. (Krupp), 6 M.	2	19·0	..	..
g.v.	Zuhaf	W.	800	173 6	26 7	11 6	1	160	Turkey	..	1894	..	..	4 4·7-in. (Krupp), 6 M.	2	12·7	120	..

UNITED STATES.—Armoured Ships.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour.			Armament.		Speed.	Normal *Coal Supply.	Complement.
															Belt.	Gun Position	Deck Plating.	Guns.	Torpedo Tubes.			
			tons.	ft.	in.	ft.	in.	ft.	in.	no.				£	inches.	inches.	inches.			knots.	tons.	
c.d.s., t. (1 t.)	Ajax	I.	2100	225	0	43	8	13	9	1	340	Pittsburg	1864	127,000	5	10	..	2 15-in. smooth-bores, 2 l.	..	6·0	160	..
t.	Alabama	S.	11,525	368	0	72	3	25	0	2	10,000	Philadelphia	Bldg.	541,000	9½–16½	17	4	4 13-in., 14 6-in. Q.F., 16 6-pr., 4 1-pr., 1 M., 2 l.	4	16·0	800/1200	489
c.d.s., t. (2 t.)	Amphitrite	I.	3990	259	4	55	9	14	3	2	1426	Wilmington	1883	..	9–7½	11½	2	4 10-in., 2 4-in. Q.F., 2 6-pr., 2 3-pr., 2 M.	..	10·5	250	182
a. c.	Brooklyn	S.	9215	400	6	64	8	26	0	2	18,769	Philadelphia	1895	610,000	3–7½	8–5	6–3	8 8-in., 12 5-in. Q.F., 12 6-pr., 4 1-pr., 4 M.	6	21·9	900/1753	522
c.d.s., t. (1 t.)	Canonicus	I.	2100	225	0	43	0	13	9	1	320	Boston	1864	127,000	5	10	..	2 15-in. 19-ton smooth-bores	..	6·0	160	..
c.d.s., t. (1 t.)	Catskill	I.	1875	200	0	46	0	11	6	1	340	New York	1863	87,300	5	11	..	2 15-in. 19-ton smooth-bores	..	6·0	150	..
c.d.s., t. (1 t.)	Comanche	I.	1875	200	0	46	0	11	6	1	340	New York	1863	125,000	5	11	..	2 15-in. 19-ton smooth-bores	..	6·0	160	..
t.	Illinois.	S.	11,525	368	0	72	3	25	0	2	10,000	Newport News	Bldg.	531,000	9½–16½	17	4	4 13-in., 14 6-in. Q.F., 16 6-pr., 4 1-pr., 1 M., 2 l.	4	16·0	800/1200	489
b.	Indiana	S.	10,288	348	0	69	3	27	1	2	9738	Philadelphia	1893	604,000	18	6–17	3	4 13-in., 8 8-in., 4 6-in., 20 6-pr. Q.F., 6 1-pr., 4 M.	7	15·5	400/1640	473
b.	Iowa	S.	11,410	360	0	72	0	27	0	2	12,105	Philadelphia	1896	614,500	H. S. 14	15	3–2½	4 12-in., 8 8-in., 6 4-in. Q.F., 20 6-pr., 4 1-pr., 4 M.	6	17·0 (t)	625/1795	505
c.d.s., t. (1 t.)	Jason	I.	1875	200	0	46	0	11	6	1	340	New York	1864	86,000	5	11	..	2 15-in. 19-ton smooth-bores	..	6·0	150	..
ram	Katahdin	S.	2155	250	9	43	6	16	5	2	5068	Bath, Me.	1893	186,000	6	18	6–3	4 6-pr. Q.F.	..	16·1	175/192	92
super-posed turrets	Kearsarge Kentucky	S.	11,525	368	0	72	2	25	1	2	10,000	Newport News.	Bldg.	800,000 each	9½–16½ N. S.	9–17 N. S.	3–5 N. S.	4 13-in., 4 8-in., 14 5-in. Q.F., 20 6-pr., 6 1-pr., 4 M., 1 l.	5	16·0	410/1210	511

c.d.s., t. (1 t.)	**Lehigh** . .	I.	1875	200	0	46	0	11	6	1	340	Chester .	1864	86,000	5	11	..	2 15-in. 19-ton smooth-bores . .	..	6·0	150	..
c.d.s., t. (1 t.)	**Mahopac** . .	I.	2100	225	0	43	8	13	9	1	320	Jersey .	1865	127,500	5	10	..	2 15-in. 19-ton smooth-bores . .	..	6·0	160	..
a. c. .	**Maine** †. . .	S.	6682	318	0	57	0	22	6	2	9293	New York .	1890	510,500	12	10–12	4–2	4 10-in., 6 6-in., 8 6-pr. Q.F., 8 1-pr., 4 M.	7	17·4	400 / 896	374
c. d. s., t. (1 t.)	**Manhattan** . .	I.	2100	225	0	43	8	13	9	1	320	Jersey . .	1865	127,000	5	10	..	2 15-in. 19-ton smooth-bores . .	..	6·0	160	..
b. .	**Massachusetts** .	S.	10,288	348	0	69	3	27	1	2	10,403	Philadelphia	1893	604,000	18 F. S.	6–17	3	4 13-in., 8 8-in., 4 6-in., 20 6-pr. Q.F., 6 1-pr., 4 M	7	16·2	400 / 1640	473
c.d.s., t. (2 t.)	**Miantonomoh** .	I.	3990	259	4	55	9	15	3	2	1426	Chester .	1876 reblt.	272,000	7	11½	2	4 10-in., 2 6-pr. Q.F., 2 3-pr., 2 1-pr.	..	10·5	250	149
c.d.s., t. (2 t.)	**Monadnock** . .	I.	3990	259	4	55	9	14	7	2	3000	S. Francisco.	1883 reblt.	275,000	9	11½	2	4 10-in., 2 4-in. Q.F., 2 6-pr., 2 3-pr., 2 1-pr., 2 M.	..	12·0	250	182
c.d.s., t. (1 t.)	**Montauk** . .	I.	1875	200	0	46	0	11	6	1	340	Brooklyn .	1864	86,000	5	11	..	2 15-in. 19-ton smooth-bores . .	..	5·5	160	..
c.d.s., b.	**Monterey** . .	S.	4084	256	0	59	0	15	4	2	5244	S. Francisco.	1891	332,000	13	10 14	3–2	2 12-in., 2 10-in., 6 6-pr. Q.F., 4 1-pr., 2 M.	..	13·6	200	195
c.d.s., t. (1 t.)	**Nahant** . .	I.	1875	200	0	46	0	11	6	1	340	Boston. .	1863	82,500	5	11	..	2 15-in. 19-ton smooth-bores . .	..	6·0	160	..
c.d.s., t. (1 t.)	**Nantucket** . .	I.	1875	200	0	46	0	11	6	1	340	Boston. .	1863	82,000	5	11	..	2 15-in. 19-ton smooth-bores . .	..	5·6	160	..
a.c. .	**New York** . .	S.	8200	380	6	64	10	26	6	2	17,401	Philadelphia	1891	597,000	4	7–10	6–3	6 8-in., 12 4-in. Q.F., 8 6-pr. 4 1-pr., 4 M.	6	21·0	750 / 1290	516
b. .	**Oregon** . .	S.	10,288	348	0	69	3	27	1	2	11,110	S. Francisco.	1893	636,000	18 H.S.	6–17	3	4 13-in., 8 8-in., 4 6-in., 20 6-pr. Q.F., 6 1-pr., 4 M.	7	16·7	400 / 1640	473
c.d.s., t. (1 t.)	**Passaic** . .	I.	1875	200	0	46	0	11	6	1	340	Brooklyn .	1863	86,000	5	11	..	2 15-in. 19-ton smooth-bores . .	..	6·0	160	..
c.d.s., t. (2 t.)	**Puritan** . .	I.	6060	289	0	60	1½	18	1	2	3700	Chester .	1884 reblt.	350,000	12	11½	2	4 12-in., 6 4-in. Q.F., 4 3-pr., 4 1-pr., 4 M.	..	12·4	400	230
c.d.s., t. (2 t.)	**Terror** . . .	I.	3990	259	4	55	9	14	7	2	1600	Philadelphia	1883 reb't.	206,800	7	11½	1½	4 10-in., 2 6-pr. Q.F., 2 3-pr., 2 1-pr., 2 M.	..	10·0	250	177
a.c. .	**Texas** . . .	S.	6315	301	4	64	1	24	0	2	8610	Norfolk .	1892	510,500	12	12	3	2 12-in., 6 6-in., 12 6-pr. Q.F., 6 1-pr., 4 M.	6	17·8 (t)	500 / 850	339
t.	**Wisconsin** . .	S.	11,525	368	0	72	3	25	0	2	10,000	S. Francisco.	Bldg.	546,000	9½–16½	17	4	4 13-in., 14 6-in. Q.F., 16 6-pr., 4 1-pr., 1 M., 2 l.	4	16·0	800 / 1200	489
c.d.s., t. (1 t.)	**Wyandotte** . .	I.	2100	225	0	43	7	13	6	1	340	Cincinnati .	1864	129,000	5	10	..	2 15-in. 19-ton smooth-bores . .	..	6·0	160	..

* The figures below the line in this column are bunker capacity.

† Destroyed by explosion, in Havana Harbour, February, 1898.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-power.	Where Built.	Date of Launch.	Cost.	Armour. Gun Position.	Armour. Deck.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
			tons.	ft.	in.	ft.	in.	ft.	in.					£	in.	in.			knots.	tons.	
cr.	**Albany** (ex Abreu*)	S. sh.	3600	330	0	43	9	16	10	2	7500	Elswick	Bldg.	..	4½	3	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M.	3	20·0	700	..
g.b.	**Annapolis**	S. sh.	1000	168	0	36	0	12	7	1	850	Elizabeth Pt.	1896	..	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 3-pr. H.I M.	..	13·1	100	144
cr.	**Atlanta** (*b*)	S.	3000	271	3	42	1	18	0	1	4030	Chester	1884	123,600	..	1½	2 8-in., 6 6-in. Q.F., 2 6-pr., 2 3-pr., 2 1-pr., 6 M.	..	(*t*) 15·6	495	278
„	**Baltimore**	S.	4413	327	6	48	7	20	6	2	10,064	Philadelphia	1888	210,000	4½	4-2½	4 8-in., 6 6-in., 4 6-pr. Q.F., 2 3-pr., 2 1-pr., 6 M.	5	20·0	400	386
..	**Bancroft**	S.	838	187	6	32	0	12	2	2	1213	Elizabeth, N.J.	1892	51,000	..	..	4 4-in. Q.F., 2 6-pr., 2 3-pr., 1 1-pr., 2 M.	2	14·37	100/203	123
cr.	**Bennington**	S.	1710	230	0	36	0	14	0	2	3436	Chester	1890	98,000	..	..	6 6-in., 2 6-pr. Q.F., 2 3-pr., 1 1-pr., 4 M.	2	17·5	200/400	195
„	**Boston**	S.	3000	271	3	42	1	18	0	1	4020	Chester	1884	123,200	..	1½	2 8-in., 6 6-in., 2 6-pr. Q.F., 2 3-pr., 2 1-pr., 2 1·8-in., 2 1·4-in., 2 M.	..	15·6	495	278
g.v.	**Castine**	S.	1177	204	0	32	1	12	2	2	2199	Bath, Me.	1892	66,000	..	..	8 4-in. Q.F., 4 6-pr., 2 1-pr., 2 M.	..	16·2	125/292	151
cr.	**Charleston**	S.	3730	312	7	46	2	19	6	2	6666	S. Francisco	1888	207,700	2	¾	2 8-in., 6 6-in., 4 6-pr., Q.F., 2 3-pr., 2 1-pr., 6 M.	4	18·2	328	300
„	**Chicago** †	S.	4500	325	0	48	2	19	0	2	9000	Chester	1885	177,800	4	1½	4 8-in., 14 5-in. Q.F., 7 6-pr., 2 1-pr., 2 M., 1 l.	..	18·0	831	409
„	**Cincinnati**	S.	3213	300	0	42	0	18	0	2	10,000	Brooklyn	1892	220,000	..	2½	1 6-in., 10 5-in. Q.F., 8 6-pr., 4 1-pr., 2 M.	6	19·0	350	314
„	**Columbia**	S.	7375	412	0	58	2	22	6	3	18,509	Philadelphia	1892	545,000	4	4-2½	1 8-in., 2 6-in., 8 4-in. Q.F., 12 6-pr., 4 1-pr., 4 M.	6	22·8	750/1670	477
cr.	**Concord**	S.	1710	230	0	36	0	14	0	2	3405	Chester	1890	98,000	..	..	6 6-in., 2 6-pr. Q.F., 2 3-pr., 1 1-pr. 4 M.	2	(*t*) 16·8	200	195
„	**Detroit**	S.	2089	257	0	37	0	14	6	2	5277	Baltimore	1892	125,500	..	3	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M.	6	18·71	200/340	256
cr.	**Dolphin**	S.	1485	239	6	31	10	14	2	1	2253	Chester	1884	61,000	..	..	2 4-in. Q.F., 2 6-pr., 4 M.	..	15·5	273	117
„	**Helena**	S.	1392	250	9	40	1	10	0	2	1988	Newport News	1896	87,100	3	2½	8 4-in. Q.F., 4 6-pr., 4 1-pr., 4 M., 1 l.	..	15·7	100/300	175
g.v.	**Machias** (*b*)	S.	1177	204	0	32	1	12	2	2	2046	Bath, Me.	1892	66,000	..	..	8 4-in. Q.F., 4 6-pr., 2 1-pr., 2 M.	..	(*t*) 15·46	125/292	151
cr.	**Marblehead**	S.	2089	257	0	37	0	14	6	2	5451	Boston	1892	137,500	..	3	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M.	6	18·4	200/340	248

g.b.	Marietta . . .	S. sh.	1200	174	0	34	0	13	5	2	850	S. Francisco.	1896	..	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 3-pr. H.I.M.	..	13·2	100	144
cr.	Minneapolis . .	S.	7375	412	0	58	2	22	6½	3	20,862	Philadelphia	1893	421,000	4	4–2½	1 8-in., 2 6-in., 8 4-in. Q.F., 12 6-pr., 4 1-pr., 4 M.	5	(t) 23·0	750/1891	477
„	Montgomery . .	S.	2089	257	0	37	0	14	6	2	5580	Baltimore .	1892	125,500	..	3	10 5-in. Q.F., 6 6-pr., 2 1-pr., 2 M. . .	6	(t) 19·0	200/340	256
„	Nashville . . .	S.	1371	220	0	38	0	12	0	2	2536	Newport News	1895	87,100	3	2½	8 4-in. Q.F., 4 6-pr., 2 1-pr., 2 M. . .	1	16·7	150/400	176
„	Newark . . .	S.	4098	311	7	49	2	18	9	2	8869	Philadelphia	1890	250,000	..	..	12 6-in. Q.F., 4 6-pr., 4 3-pr., 2 1-pr., 7 M.	..	(t) 19·0	400/809	384
„	New Orleans (ex Amazonas*) . .	S. sh.	3600	330	0	43	9	16	10	2	7500	Elswick .	1897	..	4½	3	6 6-in. Q.F., 4 4·7-in., 10 6-pr., 4 1-pr., 4 M.	3	20·0	700	..
g.b.	Newport . . .	S. sh.	1000	168	0	36	0	12	7	1	850	Bath, Me. .	1896	92,000	..	..	6 4-in. Q.F., 4 6-pr. 2 1-pr., 1 3-pr. H.I.M.	..	12·2	100	144
cr.	Olympia . . .	S.	5800	340	0	53	0	21	6	2	17,363	S. Francisco.	1892	477,600	4	4¾–2	4 8-in., 10 5-in. Q.F., 14 6-pr., 6 1-pr., 4 M.	6	(t) 21·69	400/1169	412
„	Petrel . . .	S.	892	176	3	31	0	11	7	2	1095	Baltimore .	1888	50,000	1	1	4 6-in., 2 3-pr. Q.F., 1 1-pr., 4 M. . .	..	11·7	100	122
„	Philadelphia . .	S.	4324	327	6	48	7	19	3	1	10,500	Philadelphia	1889	265,000	..	4–2½	12 6-in., 4 6-pr. Q.F., 4 3-pr., 2 1-pr., 7 M. .	5	19·68	400/1085	384
g.b.	Princeton . . .	S. sh.	1000	168	0	36	0	12	7	1	850	Camden .	1897	45,000	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr, 1 3-pr. H.I.M.	..	(t) 12·0	100	144
cr.	Raleigh . . .	S.	3213	300	0	42	0	18	0	2	10,000	Norfolk .	1892	28,600	..	2½	1 6-in., 10 5-in. Q.F., 8 6-pr., 4 1-pr., 2 M.	1	19·0	350	314
„	San Francisco . .	S.	4098	311	7	49	2	18	9	2	9913	S. Francisco.	1889	270,000	4½	3-2	12 6-in., 4 6-pr. Q.F., 4 3-pr., 2 1-pr., 7 M	6	19·5	350/809	384
„	Vesuvius . . . (Dynamite Gun Cruiser)	S.	930	252	4	26	6	10	7½	2	3794	Philadelphia	1888	70,000	..	..	3 dynamite guns, 15 in. cal., 3 3-pr. Q.F..	..	21·4	150	69
g.b.	Vicksburg . . .	S. sh.	1000	168	0	36	0	12	7	1	850	Bath, Me. .	1896	92,000	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 3-pr. H.I.M.	..	12·7	100	144
cr.	Wheeling . . .	S. sh.	1200	174	0	34	0	13	5	2	850	S. Francisco.	1897	45,000	..	..	6 4-in. Q.F., 4 6-pr., 2 1-pr., 1 3-pr. H.I.M.	..	(t) 12·8	100	144
„	Wilmington . .	S. sh.	1392	250	9	40	1	10	0	2	1894	Newport News	1895	87,100	3	2½	8 4-in. Q.F., 4 6-pr., 4 1-pr., 4 M., 2 l. .	..	(t) 15·0	100/300	175
„	Yorktown . . .	S.	1710	230	0	36	0	14	0	2	3392	Philadelphia	1888	92,900	..	..	6 6-in., 2 6-pr. Q.F., 2 3-pr., 1 1-pr., 4 M. .	2	(t) 16·1	200	195

* Purchased from Brazil, 1898. † Has received 4 cylindrical boilers and 6 Badcock and Wilcox water-tube boilers. (b) To have new machinery, modern battery and different rig.

Ten screw steamers, of from 300 tons to 560 tons, and about 300 to 500 H.P.

The cruiser Hartford (wood), 2790 tons and 2000 I.H.P., rebuilt and receiving new machinery at San Francisco, and the gunboat Ranger (iron) 1020 tons and 500 I.H.P.

Eleven screw steamers.—Lancaster (3250 tons), Marian and Mohican (1900 tons), Adams, Alliance, Enterprise and Essex (1375 tons), Alert (1020 tons), Yantic (900 tons), Fern (840 tons), Pinta (550 tons).

Enrolled Auxiliary Cruisers of the United States Navy.

	Class.	NAME.	Material of Hull.	Gross Tonnage.	Length.	Beam.	Depth.	Propellers.	Indicated Horse Power.	Where Built.	When Built.	Owners.	Armament, all Q.F.	Speed.
Atlantic Coast.	1st	St. Louis	S.	11,629	535 5	63 0	26 8	2	18,000	Philadelphia	1895	International Navigation Company.	8 6-in., 4 6-pr., 4 M.	22·2
	1st	St. Paul	S.	11,629	535 5	63 0	26 8	2	18,000	,,	1895	,,	8 6-in., 4 6-pr., 4 M.	22·5
	1st	Paris.	S.	10,794	517 0	63 3	22 0	2	20,000	Clydebank, Scotland	1889	,,	12 6-in., 6 6-pr., 6 M.	20·7
	1st	New York	S.	10,802	517 0	63 3	22 0	2	20,000	,,	1888	,,	12 6-in., 6 6-pr., 6 M.	20·6
	3rd	Newport	I.	2735	326 0	38 2	23 9	1	..	Chester, Pa.	1880	Pacific Mail.	8 4-in., 8 M.	16·0
	3rd	City of Para	I.	3532	345 0	38 6	19 9	1	2250	,,	1878	,,	8 4-in., 8 M.	12·0
	3rd	Caracas	I.	2584	283 6	40 2	20 5	1	..	Philadelphia	1889	Red D Line.	8 4-in., 6 M.	13·0
	3rd	Philadelphia	I.	2520	300 0	35 0	20 6	1	..	,,	1885	,,	8 4-in., 6 M.	12·0
	3rd	Venezuela	I.	2343	303 6	40 2	20 5	1	..	,,	1889	,,	8 4-in., 8 M.	..
	3rd	Orizaba	S.	3497	336 2	43 2	22 0	1	..	Chester, Pa.	1889	Cuba Mail.	8 4-in., 6 M.	14·0
	3rd	Yumuri	S.	3497	336 2	43 2	22 3	1	..	,,	1889	,,	8 4-in., 6 M.	14·0
	3rd	City of Washington	I.	2684	300 5	38 4	19 2	1	2500	,,	1877	,,	8 4-in., 8 M.	15·0
	3rd	Saratoga	I.	2820	298 0	38 6	23 5	1	..	,,	1878	,,	8 4-in., 8 M	14·0
Atlantic Coast.	3rd	Seneca	I.	2729	271 5	40 0	16 4	1	..	,,	1884	,,	8 4-in., 6 M.	..
	3rd	Yucatan	I. & S.	3525	336 2	43 2	22 3	1	..	,,	1890	,,	8 4-in., 6 M.	14·0
	3rd	Segurança	S.	4033	321 3	45 3	17 4	1	..	,,	1890	,,	6 5-in., 4 4-in., 4 1-pr., 3 M.	14·0
	3rd	Vigilancia	S.	4115	321 8	45 2	16 5	1	..	,,	1890	,,	6 5-in., 4 4-in., 4 1-pr., 3 M.	14·0
	4th	Advance	I.	2605	295 0	38 0	23 4	1	1350	,,	1883	Panama R. R. Co.	Small Q.F.	15·0
	4th	Alliança	I.	2985	303 0	42 0	15 0	1	2250	,,	1886	,,	,,	14·0
Pacific Coast.	3rd	City of Sydney	I.	3017	339 0	40 2	20 5	1	1950	,,	1875	Pacific Mail.	6 6-in., 10 6-pr., 2 M.	15·0
	3rd	City of Peking	I.	5079	408 0	47 0	19 5	1	4500	,,	1874	,,	6 5-in., 12 6-pr.	13·0
	3rd	City of Rio de Janeiro	I.	3548	345 0	38 6	19 9	1	2000	,,	1878	,,	8 4-in., 8 M.	14·0
	3rd	Peru	S.	3528	336 0	45 9	27 6	1	2800	San Francisco	1892	,,	9 5-in., 12 6-pr.	14·0
	4th	City of Panama	I.	1490	248 0	36 0	20 2	1	650	Chester, Pa.	1873	,,	Small Q.F.	..
	4th	Colon	I.	2686	280 0	40 0	28 6	1	1350	,,	1872	,,	,,	..
	4th	San Jose	I.	2081	283 0	37 0	21 0	1	1400	,,	1882	,,	,,	..
	4th	San Blas	I.	2075	283 0	37 0	21 0	1	1400	,,	1882	,,	,,	..
	4th	San Juan	I.	2076	283 0	37 0	21 0	1	1400	,,	1882	,,	,,	..
	4th	Acapulco	I.	2572	290 0	40 0	20 0	1	1350	Wilmington	1873	,,	,,	..

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LITTLE OR NO IMPORTANCE.

Belgium.—Twelve steam vessels, between 419 and 684 tons net, launched between 1870 and 1888, principally employed as packets, which are under the orders of the Government.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's Yacht. Two armoured gunboats, for the defence of the Danube, building at Leghorn. Other ships are to be laid down. A despatch vessel (700 tons) of the French Casabianca type is in hand at Bordeaux.

Egypt.—This Power has now no efficient warships.

Hayti.—Steel gun vessel—Crête à Pierrot—940 tons, length 210 ft., beam 30 ft., 1 6·2-in., 1 4·7-in., and 4 3·9-in. Q.F., 6 M. Steel gunboat—Capois la Mort—260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines—1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 L., 2 M. Three iron or steel sloops:—St. Michael, 1804, and Toussaint L'Ouverture, of from 500 to 900 tons, all of 12 to 14 knots speed, and armed with one large and four to eight small guns. Gun vessel, 22nd of December, of 900 tons, 9 knots speed, armed with four 40-pdr. Armstrongs.

Liberia.—The Gorronommah gunboat of 150 tons displacement; completed 1892, and another one, the Rocktown, completed at Rotterdam in 1896 (12 knots on trial).

Mexico.—The Zaragoza, built of steel, 1200 tons, 1300 horse-power, 15 knots speed, and armed with four 4·7-in. guns and 4 rapid-firing guns. Two gun vessels of 450 tons, and 11 knots speed, armed with two 6½-inch muzzle loaders and two small guns. Two small gunboats of 10 knots speed. A gunboat is in hand at New Orleans.

Morocco.—A torpedo cruiser, of 1200 tons displacement, 2500 HP., 18 knots speed, and carrying two guns, 4·7-in. B.L., and 4 Q.F. guns, built in 1892.

Persia.—Despatch vessel—the Persepolis—of 1200 tons and 10 knots speed. She is armed with 5 small breech-loading guns.

Peru.—Lima, built in 1881, of 1700 tons displacement, 1800 horse-power, and 16 knots speed; armed with two 6-in. B.L.R. guns. Screw steamer Santa Rosa, of about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in. thick), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam, 1320 tons, 4500 I.H.P.; 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 350 tons; Grivitza, 180 tons. Six gunboats of 45 to 110 tons, 7 to 9 knots speed. Six coast-guard vessels—Oltul, Siretul, Bistritza, Olteano, Smeo, and Monteano—95 tons, 100 ft. long, 13·6 in. beam, 6 ft. draught; natural draught 11 knots, forced draught 13½ knots; 1 Q.F., 2 M. Screw steamer—Romania—240 tons, repaired 1890. Six first-class torpedo-boats (120 ft. 6 in., 21 knots); 2 second class (63 ft., 16·5 knots), built 1882–1888.

Saint Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Two corvettes (800 tons, 8 guns); six gunboats. One deck-protected cruiser, the Maha Chakrkri, 290 ft. long, 39 ft. 4 in. broad, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pdr. quick-firing guns. Cruiser Makut-Rajakamar, 500 tons.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; General Rivera, 300 tons, 12 knots speed, armed with 1 5·9-in. and 1 2·3-in. gun; and the General Jaurez.

Venezuela.—Gun-vessel, Libertador, 832 tons. Four river gunboats building.

BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

The Tables below are substantially those which appeared in last year's *Naval Annual*. By the kind assistance of many torpedo-boat builders, British and foreign, they have been brought up to date.

The following is the usual synopsis of the torpedo-boats, other than submarine-boats, described in the tables:—

Power.	Destroyers.	Sea-going. 126 ft. to 150 ft.	1st Class. 115 ft. to 125 ft.	2nd Class. 101 ft. to 114 ft.	3rd Class. 86 ft. to 100 ft.	Vedettes. 85 ft. and under.
Great Britain ..	97	43	26	4	20	73
British Possessions	..	8	..	1	..	11
Argentine Republic	4	8	..	..	4	14
Austria-Hungary ..	..	32	9	22	9	1
Brazil	..	15	..	..	5	7
Chili	4	6	1	..	8	4
China	4	6	1	25	2	13
Costa Rica	..	..	..	..	..	1
Denmark	4	6	1	3	2	14
France	18	40	69	78	36	9
Germany	12	95	4	9	..	16
Greece	..	6	..	..	11	34
Italy	8	105	..	4	36	32
Japan	13	2	1	21	19	..
Mexico	..	5	..	..	..	..
Netherlands	13	6	9	3	6	23
Norway	..	3	..	7	3	4
Portugal	..	..	15	5	1	24
Roumania	1	3	..	..	..	2
Russia	29	75	6	1	..	109
Spain	6	14	4	2	..	7
Sweden	..	1	..	10	7	7
Turkey	3	9	7	..	7	..
United States ..	9	13	..	5	1	4

Great Britain and Dependencies.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain.			Feet	Feet.	Feet.		Tons.		Knots.				Tons.
TORPEDO-BOAT DESTROYERS													
Ardent	Chiswick ..	1894	200	19	7	2	265	4,800	27·97	1-12 pr. 5-6 prs.	2	45	60
Banshee	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 5-6 prs.	2	50	
Boxer	Chiswick ..	1894	200	19	7·8	2	250	4,200	29·17	1-12 pr. 5-6 prs.	2	45	60
Bruizer	Chiswick ..	1895	200	19	7·8	2	265	4,500	29·97	1-12 pr. 5-6 prs.	2	45	60
Charger	Poplar	1894	190	18·5	5·25	2	250	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	East Cowes ..	1894	205·6	20	..	2	270	4,370	27·21	1-12 pr. 5-6 prs.	2	50	
Contest	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·4	1-12 pr. 5-6 prs.	2	50	
Daring	Chiswick ..	1893	185	19	6·3	2	260	4,842	27·90	2-12 prs. 3-6 prs.	3		50
Dasher	Poplar	1895	190	18·5	5·25	2	250	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
Decoy	Chiswick ..	1894	185	19	7	2	260	4,200	27·77	1-12 pr. 3-6 prs.	3		50
Dragon	Birkenhead ..	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 5-6 prs.	2	50	
Ferret	Birkenhead ..	1893	194	19·25	5	2	280	4,810	27·62	1-12 pr. 3-6 prs.	3	50	70
Fervent	Paisley	1895	200	19	7·8	2	270	3,800	[27]	1-12 pr. 5-6 prs.	2	50	70
Handy	Govan	1895	200	19	7·8	2	260	3,800	27·04	1-12 pr. 5-6 prs.	2	50	70
Hardy	Sunderland ..	1895	196	19	5	2	245	4,200	26·8	1-12 pr. 5-6 prs.	2	50	70
Hart..	Govan	1895	185	19	7	2	260	4 010	27·07	1-12 pr. 5-6 prs.	2	50	70

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO BOAT DESTROYERS			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Hasty	Poplar	1894	190	18·5	5·25	2	250	3,250	26·08	1–12 pr. 5–6 prs.	2	45	60
Haughty	Sunderland	1895	196	19	5	2	265	4,000	27·1	1–12 pr. 5–6 prs.	2	50	60
Havock	Poplar	1893	180	18·5	5·25	2	240	3,500	26·77	1–12 pr. 3–6 prs.	3	43	57
Hornet	Poplar	1893	180	18·5	5·25	2	240	4,000	27·31	1–12 pr. 3–6 prs.	3	43	57
Hunter	Govan	1895	..	..	..	2	260	4,000	27·2	1–12 pr. 5–6 prs.	2		
Janus	Jarrow	1895	200	19·7	6·5	2	252	3,789	27·8	1–12 pr. 5–6 prs.	2	50	60
Lightning	Jarrow	1895	200	19·7	6·5	2	252	4,007	27·94	1–12 pr. 5–6 prs.	2	50	60
Lynx	Birkenhead	1894	194	19·25	5	2	280	4,000	27·00	1–12 pr. 3–6 prs.	3	50	70
Opossum	Hebburn	1895	200	19	5·2	2	290	4,052	28·24	1–12 pr. 5–6 prs.	2	50	60
Porcupine	Jarrow	1895	200	19·7	6·5	2	288	3,866	27·91	1–12 pr. 5–6 prs.	2	50	60
Ranger	Hebburn	1895	200	19	5·2	2	264	3,900	27·13	1–12 pr. 5–6 prs.	2	50	60
Rocket	Clydebank	1894	205·6	19·5	5·25	2	280	4,200	27·37	1–12 pr. 5–6 prs.	2	50	60
Salmon	Hull	1895	200	19·5	5·4	2	264	3,580	27·60	1–12 pr. 5–6 prs.	2	50	60
Shark	Clydebank	1894	205·6	19·5	5·25	2	280	4,250	27·59	1–12 pr. 5–6 prs.	2	50	60
Skate	Barrow	1895	195	20·5	..	2	265	4,100	27·10	1–12 pr. 5–6 prs.	2	50	60
Snapper	Hull	1895	200	19·5	5·5	2	270	4,500	27·9	1–12 pr. 5–6 prs.	2	50	60
Spitfire	Elswick	1895	200	19	5·3	2	300	3,780	27·5	1–12 pr. 5–6 prs.	2	45	60
Starfish	Barrow	1894	195	20·5	..	2	265	4,000	27·97	1–12 pr. 5–6 prs.	2	45	60
Sturgeon	Barrow	1894	195	20·5	..	2	265	4,010	27·16	1–12 pr. 5–6 prs.	2	45	60
Sunfish	Hebburn	1895	200	19	5·2	2	290	4,292	27·62	1–12 pr. 5–6 prs.	2	50	60
Surly	Clydebank	1894	205·6	19·5	5·25	2	280	4,400	28·05	1–12 pr. 5–6 prs.	2	50	50
Swordfish	Elswick	1895	200	19	5·3	2	300	4,100	[27]	1–12 pr. 5–6 prs.	2	45	60
Teazer	East Cowes	1895	200	19·5	5·6	2	270	4,500	[27]	1–12 pr. 5–6 prs.	2	50	60
Wizard	East Cowes	1895	200	19·5	5·2	2	270	4,400	[27]	1–12 pr. 5–6 prs.	2	45	60
Zebra	Blackwall	1895	200	20	6	2	300	3,850	27·00	1–12 pr. 5–6 prs.	2	50	60
Zephyr	Paisley	1895	200	19	5·3	2	270	3,850	[27]	1–12 pr. 5–6 prs.	2	50	60
Albatross	Chiswick	bldg.	227·6	21·3	8·4	2	360	7,500	32	1–12 pr. 5–6 prs.	2	60	80
Angler	Chiswick	1897	210·6	19·6	7·2	2	300	5,400	30	1–12 pr. 5–6 prs.	2	60	80
Arab	Clydebank	bldg.			Design not complete					1–12 pr. 5–6 prs.	2	60	80
Ariel	Chiswick	1897	210·6	19·6	7·2	2	300	5,430	30	1–12 pr. 5–6 prs	2	60	80
Avon	Barrow	1896	210·6	21·6	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Bat	Jarrow	1896	210·6	21·6	5·8	2	300	5,900	30	1–12 pr. 5–6 prs.	2	60	80
Bittern	Barrow	1897	210·6	21·6	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Brazen	Clydebank	1896	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Bullfinch	Hull	bldg.	210	20·6	5·8	2	300	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Chamois	Jarrow	1896	210·5	20·6	6·9	2	325	6,265	30·3	1–12 pr. 5 6 prs.	2	60	80
Cheerful	Hebburn	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Coquette	Chiswick	bldg.	210	19·6	7·2	2	300	5,400	30	1–12 pr. 5–6 prs.	2	60	80
Crane	Jarrow	1896	215	20·7	6·8	2	324	6,336	30·3	1–12 pr. 5 6 prs.	2	60	80
Cygnet	Chiswick	bldg.	210	19·6	7·2	2	300	5,400	30	1–12 pr. 5–6 prs.	2	60	80
Cynthia	Chiswick	bldg.	227·6	22·0	9	2	300	7,700	32	1–12 pr. 5–6 prs.	2	60	80
Desperate	Chiswick	1895	210	19·6	7·2	2	300	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Dove	Hull	bldg.	210·0	20·6	5·8	2	300	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Earnest	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Electra	Clydebank	bldg.	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Express	Birkenhead	1897	227·6	22·0	9	2	300	7,700	33	1–12 pr. 5–6 prs.	2	60	80
Fairy	Govan	1897	227·6	22·0	9	2	300	7,700	32	1–12 pr. 5–6 prs.	2	60	80
Fame	Chiswick	1896	210·6	21·7	5·8	2	300	5,400	30·15	1–12 pr. 5 6 prs.	2	58	80
Fawn	Jarrow	1897	215	20·7	6·8	2	324	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Flirt	Jarrow	1897	215	20·7	6·8	2	324	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Flyingfish	Jarrow	1897	215	20·7	6·8	2	324	6,457	30·4	1–12 pr. 5–6 prs.	2	58	80
Foam	Chiswick	1896	210·6	21·7	5·8	2	300	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Gipsy	Govan	1897	227·6	22·0	9	2	300	7,700	32	1–12 pr. 5–6 prs.	2	60	80
Griffon	Birkenhead	1896	210·0	20	5·3	2	300	6,000	30·11	1–12 pr. 5–6 prs.	2	58	80
Kestrel	Clydebank	bldg.	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Lee	Sunderland	bldg.	210·0	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Leopard	Barrow	1897	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Leven	Glasgow	bldg.	218·0	20.0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Locust	Birkenhead	1896	210	21·7	5·3	2	300	6,000	30·16	1–12 pr. 5–6 prs.	2	58	80
Mallard	Chiswick	1896	210·6	21·7	5·8	2	300	5,500	30	1–12 pr. 5 6 prs.	2	58	80
Mermaid	Hebburn	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Orwell	Birkenhead	bldg.	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Osprey	Govan	bldg.	227·6	22·0	9	2	300	7,700	32	1–12 pr. 5–6 prs.	2	60	80
Otter	Barrow	1896	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Panther	Birkenhead	1897	210·6	21·7	5·3	2	300	6,000	30·14	1–12 pr. 5–6 prs.	2	58	80
Quail	Birkenhead	1895	213·6	21·6	5·3	2	300	6,000	30·38	1–12 pr. 5–6 prs.	2	58	90
Recruit	Glasgow	bldg.	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Seal	Birkenhead	1897	218·0	20·0	5·6	2	300	6,000	30·15	1–12 pr. 5–6 prs.	2	58	80
Sparrowhawk	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Spiteful	Jarrow	bldg.	215	20·75	6·88	2	322	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Stag	Chiswick	bldg.	210.0	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Star	Jarrow	1896	215	20·75	6·88	2	328	6,266	30·6	1–12 pr. 5–6 prs.	2	58	80
Sylvia	Sunderland	bldg.	210	19·9	7.6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Thrasher	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5 6 prs.	2	58	80
Violet	Sunderland	bldg.	210	20·75	6·88	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Virago	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5 6 prs.	2	58	80
Vulture	Clydebank	bldg.	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Whiting	Jarrow	1896	215	20·75	6·88	2	333	6,315	30·2	1–12 pr. 5 6 prs.	2	58	80
Wolf	Birkenhead	1897	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
1 Unnamed													

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
First Class—													
1 (*ex* Lightning)	Chiswick	1877	84·6	10·9	5	1	27	460	19	..	1	..	
2–9 (8 boats)	Chiswick	1878–9	87	10·9	4	1	28	450	20	..	1	15	
10	Chiswick	1880	90·5	10·9	4	1	28	450	21·7	..	1	15	
11, 12 (2 boats)	Chiswick	1880	87	10·9	4	1	28	450	20	..	1	15	7
13	Lambeth	1878	87	10·9	4	1	28	460	21	..	2	15	7
14	Poplar	1878	87	11	4·5	1	33	550	22	..	2	15	7
15	..	..	87	10·9	4	1	28	450	21	..	2	15	7
17, 18 (2 boats)	Poplar	1877	86	11	4·5	1	33	450	21	..	2	15	7
19	East Cowes	1878	87	10·9	4	1	28	460	21	..	2	15	7
20	..	1880	87	10	4	..	28	360	16·9	..	2	15	
21, 22 (2 boats)	Chiswick	1885	113	12·5	5·7	1	63	730	20	..	3	..	10
23, 24 (2 boats)	Poplar	1885–6	113	12·5	5·5	1	67	600	19·5	2–3 prs.	3		
25–29 (5 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	600	21	..	4	15	
30–33 (4 boats)	Poplar	1886	125	13	5·5	1	60–66	670	19·5	2–3 prs.	5	15	20
34–38 (5 boats)	East Cowes	1886	125	14·6	4	1	60–66	950	18–19	..	5	15	
39, 40 (2 boats)	Poplar	1885	100	12·5	..	..	40	500	..	..	1	15	
41–60 (20 boats)	Chiswick	1886	127·5	12·5	6·2	1	60	700	21	2–3 prs.	4	15	
61, 63–74, 76–78 (16 boats)	Poplar	1886	125	13	5·5	1	75	700	19–20	2–3 prs.	5	15	20
79	Poplar	1886	125	13	5·5	..	75	1,000	22·4	2–3 prs	..	15	20
80	Poplar	1887	135	14	6	1	105	1,540	23	4–3 prs.	5	21	30
81 (*ex* Swift)	East Cowes	1885	150	17·5	..	1	125	..	..	6–3 prs.	3	25	35
82–87 (6 boats)	Poplar	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
88, 89 (2 boats)	Poplar	1894	142	14·75	4	1	112	1,600	..	3–3 prs.	3	18	20
90	Poplar	1895	140	14·25	3·75	1	100	1,430	..	3–3 prs	3	18	18
91, 92 (2 boats)	Chiswick	1894	140	15·5	7·5	1	130	2,400	23-24	3–3 prs.	3	18	25
93	Chiswick	1893	140	15·5	5·4	2	130	2,200	23·5	3–3 prs.	3	18	25
94–96 (3 boats)	East Cowes	1894	140	15·5	..	1	130	2,000	23·2	3–3 prs.	3	18	25
97	Birkenhead	18.3	140	15·5	..	1	130	2,690	23.35	3–3 prs.	3	18	25
Second Class—													
38–48 (10 boats)	Poplar	1889	60	9·2	3·7	1	16·5	230	16·5	1 mach.	1	9	11
49, 50 (2 boats)	Poplar	1887	60	8·5	3	1	15	200	17	1 mach.	1	9	
51–62 (12 boats)	Chiswick	1878–9	60·5	7·5	3·5	1	..	..	16·5	..	2	7	
63	..	1879	60	..	..	1	..	..	15	..	2		
64–73 (10 boats)	Chiswick	1880–1	60·5	7·5	3·5	1	..	..	16–17	..	2	7	
74, 75, 96, 97 (4 boats)	Poplar	1883	62	7·6	3·6	1	12	..	16	1 mach.	2	7	
76–95 (20 boats)	Chiswick	1882–3	63	7·5	3·5	1	..	..	16·5–17	..	2	7	
98	Chiswick	1883	66·3	7·5	2·5	hyd.	..	120	12·6	..	2	7	
99, 100 (2 boats)	Chiswick	1886	64	8	3·6	1	..	..	16–16·8	..	2	7	
101	..	..	64	..	..	..	..	..	..	..	2	7	
1–9 (9 boats)	East Cowes	..	56	..	..	1	12	..	14·5	2 mach.	sp	..	·7
Victoria.													
Childers	Chiswick	1883	113	12·5	5·9	1	65	730	20	2–1 prs.	..	12	10
One boat	Poplar	1891	130	13·5	5·7	1	82	1,150	23	3–3 prs.	3	19	20
Nepean, Lonsdale (2 boats)	Chiswick	1884	63	7·5	3·2	1	12	150	17·5	..	1	7	
New South Wales.													
Acheron, Avernus (2 boats)	..	1879	..	..	..	1	16	300	16				
Queensland.													
Mosquito	Chiswick	1884	63	7·5	3·2	1	12	..	17	..	1	7	
Wasp	..	..	..	..	..	..	12	..	..	..	..	7	
Tasmania.													
One boat	Chiswick	1884	63	7·5	3·2	1	12	..	17	..	1	7	
New Zealand.													
Nos. 1–4 (4 boats)	Chiswick	1884	63	7·5	3	1	12	170	17	1 mach.	Sp.		
India.													
Nos. 1–3 (3 boats)	Chiswick	1888	131·5	14·8	7·1	1	96	1,270	23·2	2 Q.F.	5		
Nos. 4–6 (3 boats)	East Cowes	1889	130	14·6	..	..	95	1,030	20				
No. 7	Paisley	1888	130·4	14	..	..	92	1,060	21				

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Santa Fé	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26·5 *t.*	*1 14-pr.,	3	54	80
Corrientes	Poplar.. ..	1896	190	19 6	7·4	2	280	4,000	27·4 *t.*	3 6-pr.	3	54	80
Missiones..	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	Q.F., 2 M.	3	54	80
Entre Rios	Poplar.. ..	1896	190	19 6	7·4	2	280	4,000	26·7 *t.*		3	54	80
FIRST CLASS—													
2 boats	Chiswick ..	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Poplar.. ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15
4 boats	Poplar.. ..	1880–2	100	12·5	6	1	52	600	20	2 mach.	3	14	10
SECOND CLASS—													
Nos. 1–8 (8 boats)..	Poplar.. ..	1890	60	9.2	3	1	16	230	17	1 Q.F.	1	10	1.25
Nos. 9–10 (2 boats)	Chiswick ..	1881	60	7·5	3·5	1	16	230	17	..	1		
VEDETTE BOATS—													
Nos. 1–4 (4 boats)..	..	1875	55	7	..	..	..	..	..	.	sp.		

The two 150-ft. boats are named Comodoro Py and Murature.

The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.

The four 100-ft. boats are named Alerta, Centella, Ferre, and Py.

* ¼-in. plating over entire engine and boiler space.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats	Poplar.. ..	1886	135	13·7	5·6	1	95	900	22·4	2 Nord.	2	16	28
22 boats	Elbing, Trieste, &c.	1886-9	128	15·9	6·9	1	83	900 / 1,000	17·5 to 21·5	2 mach.	2	15	28
5 boats	Poplar.. ..	1897 Bldg.	152·6	15·3	..	1	130	2,000	24	2 3-pr. Q.F.	3	..	..
1 boat	Poplar.. ..	Bldg.	152·6	15·3	..	1	130	2,000	24	2 3-pr. Q.F.		..	..
Viper	Poplar.. ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr. Q.F.	2	26	30
Natter	Elbing ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr. Q F.	3	..	30
SECOND CLASS—													
Nos. 9, 10 (2 boats)	Chiswick, Poplar, Pola and Elbing	1881	98·5	10·8	2·9	1	37	450	17	1 Q.F.	1		
Nos. 11–32 (22 boats)		1883–7	107	11·6	3·1	1	47	630	17				
Nos. 33–39 (9 boats)		1887–91	118·1	14·4	3·3	1	64	700	18	2 Q.F.	1		
No. 1 (1 boat).. ..	E. Cowes ..	1878	..	..	..	..	11	100	..	..	1		
Nos. 2–8 (7 boats)..	Pola and Poplar ..	1878–81	87·4	9·6	2·8	1	27	300	15	..	1		..

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Nos. 1-5 (5 boats)	Poplar.. ..	1882	100	12·5	5·5	1	52	600	20	2 mach.	2	16	20
Araguary..	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Iguatemi..	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcilio Diaz	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·8	2 Q.F.	4	27	22
5 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Piratiny	..	..	130	12	..	..	..	..	10	2–1 pr.	1		
Poty	..	..	126	12	3	..	30	..	18	1–1 pr.	1		
Second Class—													
Inhanhuay (wood)..	New York..	1893	90	10	3	..	17	..	25	1–1 pr.	1	10	
4 boats	..	1883–4	..	..	..	1	17	..	17				
1 boat	Chiswick ..	1885	63	75	3·2	1	..	..	17	..	..	..	2
1 boat	Poplar.. ..	1886	60	8	3	1	14	200	17	..	1		
Third Class—													
Moxoto	Poplar.. ..	1883	60	9·3	..	..	..	..	16	1–1 pr.	1		
5 boats	Chiswick ..	1883	45	6	1·2	1	3·5	..	12-13	1 mach.	sp.		

Chili.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero.. ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·42	1-12 pr Q.F. 5-6 pr.	2	65	90
Teniente Serrano ..	Birkenhead.	1896	210	21·6	..	2	300	6000	30·35	1–12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme	Birkenhead.	1896	210	21·6	..	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
First Class—													
3 boats	Poplar.. ..	1881	86	12·5	..	1	25	400	19-20	..	4	15	
5 boats	Poplar.. ..	1881	100	12·5	..	1	35	400	18–19	4 mach.	4	15	9
Sergente Aldea ..	Poplar.. ..	1886	125	13·5	5·5	1	70	800	20	2 Q.F.	4	18	15
Injeniero Hyatt, Cirujano Videla and 4 others (Viper type)	Poplar.. ..	1896	152·6	15·3	7·9	1	140	2200	27·5–27·2	3-3 pr. Q.F.	3	28	40
Second Class—													
Colocolo	Poplar ..	1880	45	8	..	..	5	40	16	2 mach.	2		
Tucapel	..	1880	50	9	..	..	5	40	16	2 mach.	2		
1 boat	East Cowes	1887	50	..	..	..	..	..	16				
1 boat	East Cowes	1892	60	9·6	5	1	15	270	19	..	1		

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
4 unnamed	Elbing ..	Bldg.	193·6	..	..	2	..	6,500	32	..	..	..	..
FIRST CLASS—													
1 boat	Elbing ..	1886	144·3	16·4	7·5	1	128	1,400	24·2	4 1-pr. revs.	2	20	15
1 boat	Poplar.. ..	1887	128	13	5	1	69	1,000	23·9	{ 3 Q.F., 4 Gatlings }	3	28	15
25 boats	Stettin, &c..	1886–87	110	13	4·9	1	65	1,000	19·5	1-pr. revs.	3	16	10
2 boats	Stettin ..	1883	86	10·4	3·4	1	28	650	18·2	1-pr. revs.	2	16	12
1 boat	Stettin ..	1884	123·5	21·7	..	..	..	..	19	..	5	16	
2 boats	Elbing ..	1895	128	15·8	..	..	120	1,250	24·5	Q.F.	2		
2 boats	..	Pro.	..	..	..	..	..	..	...	..	..	..	..
SECOND CLASS—													
11 boats	Elbing ..	1885–86	85	11·9	4·8	1	27	400	19	..	1	..	5
2 boats	China	..	52	6·7	3·3	1	..	..	16				

Particulars uncertain.

Costa Rica.

Costa Rica has one 62-ft., 15 knot boat.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Delfinen	Chiswick ..	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Haien	Chiswick ..	1879	94	10·5	5	1	32	350	21·3	1 mach.	1	12	4
Havhesten	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Chiswick ..	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Söulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	11
Stóren	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Chiswick ..	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9
1 boat	Copenhagen	Bldg.	85	13	..	..	44	360	14	2 mach.	1	..	..
SECOND CLASS—													
Nos. 4, 5 (2 boats) ..	Chiswick ..	1882	63	7·5	2·5	1	15	150	16·9	1 mach.	2	6	1
Nos. 6, 7 (2 boats) ..	Chiswick ..	1884	66·8	8	4·2	1	16	170	15·4	1 mach.	2	6	1·5
Nos. 8, 9 (2 boats) ..	Chiswick ..	1886	69·5	8·1	3·8	1	17	170	15·7	1 mach.	2	6	1
Nos. 10, 11 (2 boats).	Chiswick ..	1888	70·2	8	4	1	18	180	15·8	1 mach.	2	6	1
Nos. 12, 13 (2 boats).	Chiswick ..	1889	78·3	9	4·9	1	24	350	18	1 mach.	2	8	3
1 boat	Chiswick ..	1875	58	7·5	3	1	..	..	16	..	sp.		

Four destroyers and two boats are provided for.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Pique	Havre	Bldg.	185·9	19·6	9.11	2	319	5700	26·0	1–12 prs.	2	48	33
Epée	Havre	Bldg.	185·9	19·6	9·11	2	319	5700	26.0	1–12 prs.	2	48	33
Framée	Bordeaux	Bldg.	185·9	19·6	9·11	2	319	5700	26·0	4–6 prs.	2	48	33
Yatagan	Bordeaux	Bldg.	185·9	19·6	9·11	2	319	5700	26·0	4–6 prs.	2	48	33
SEA-GOING—													
Agile	La Seyne ..	1889	139	14·7	7·7	2	121	1,100	20·4	3–3 prs.	2	26	14
Alarme	St. Nazaire	1889	151	15·7	8·3	2	169	1,400	20·5	2–3 prs.	4	30	40
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	25·17	2–3 prs.	2	34	17
Archer	Normand ..	1893	138	14·7	6·5	2	131	1,250	21	2–3 prs.	2	26	17
Argonaute..	St. Denis ..	1893	141	16·4	9·3	2	132	1,500	25·1	2–3 prs.	2	34	16
Ariel	Normand ..	1895	141	16·4	9·3	2	120	1,500	23·5	2–3 prs.	2	34	16
Aventurier	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	20·5	2–3 prs.	4	34	40
Averne	Havre ..	1894	141	16·4	9·3	2	133	1,500	24·4	2–3 prs.	2	27	16
Cerbère	Normand ..	Bldg.	137·8	14·6	7·9	2	127	2,000	25·0	2–3 prs.	2	34	17
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	134	2,700	27·2	2–1 prs.	2	32	17
Corsaire	St. Denis ..	1893	160·5	15	5·4	2	171	2,500	25·5	4–1 prs.	2	32	15
Coureur	Chiswick ..	1888	147·5	14·5	4·6	2	129	1,550	23·28	4 Nords.	2	27	22
Cyclone (ex-Tenare) ..	Havre	Bldg.	144·2	15·2	10·0	2	152	3,200	30	2–1 prs.	2	..	..
Dauphin	Havre ..	1894	141	16·4	9·3	2	137	1,500	25·22	2–3 prs.	2	34	16
Défi	St. Nazaire..	1889	151	15·7	8·3	2	173	1,400	21	2–3 prs.	4	30	40
Dragon	Normand ..	1892	138	14·7	8·2	2	129	1,400	25	2–3 prs.	2	26	15·5
Eclair	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·5	3–3 prs.	2	26	17
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2–3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,200	31·2	2–1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2–3 prs.	2	26	15·5
Grondeur	Havre	1892	147·5	14·5	5	2	130	1,550	24	2–3 prs.	2	27	20
Kabyle	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·6	3–3 prs.	2	27	17
Lancier	Normand ..	1893	138	14·7	8·2	2	128	1,400	25·79	2–3 prs.	2	26	15·5
Lansquenet	Nantes ..	1893	165·4	15·8	4·2	2	150	2,800	..	2–3 prs.	..	..	..
Mangini	Nantes ..	1896	147·6	14·8	7·9	2	129	2,100	27·5	2–3 prs.	2	34	17
Mousquetaire	Havre ..	1892	154	15·7	7	2	150	2,100	24·77	2–1 prs.	2	32	18
Orage	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·7	3–3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15·7	8·3	2	174	1,400	20	2–3 prs.	4	30	40
Sarrazin	Bourdeaux..	1893	139	14·7	7·7	2	131	1,100	20·5	3–3 prs.	2	26	14
Téméraire	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	21	2–3 prs.	4	30	40
Ténare	Normand ..	Bldg.	137·8	14·6	7·9	2	127	2,000	25·0	2–3 prs.	2	34	17
Tourbillon	Bourdeaux..	1892	139	14·7	7·7	2	131	1,100	20·5	3–3 prs.	2	26	14
Tourmente	St. Denis ..	1893	141	16·4	9·3	..	132	1,500	24·6	2–3 prs.	2	25	15
Turco	St. Denis ..	1892	138	14·7	8·2	2	124	1,400	21·3	2–3 prs.	2	26	15·5
Véloce..	Havre	1892	147·5	14·5	5	2	130	1,550	23·6	2–3 prs.	2	27	20
Zouave	St. Denis ..	1892	138	14·7	8·2	2	124	1,400	21·3	2–3 prs.	2	26	15·5
5 boats	..	Pro.	..	..	..	..	150	..	..	..	..	..	..
FIRST CLASS—													
Balny	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Bouët-Willaumez	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Capt. Cuny	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Capt. Mehl	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Challier	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Dehorter	St. Denis ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Deroulède	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Doudart de Lagrée	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Edmond Fontaine	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
151 (*ex* G. Charmes) ..	La Seyne ..	1886	132·5	12·5	6·	1	80	560	18·8	2–1 prs.	..	23	12
126–129 (4 boats).. ..	Normand ..	1888–9	118	13·2	8·6	2	79	1,250	21	2–1 prs.	2	21	10
145–149 (5 boats).. ..	Normand ..	1891–3	118	13·2	8·7	2	80	1,300	23·9	2–1 prs.	2	21	10
152–154 (3 boats).. ..	Normand ..	1892–	118	13·2	8·7	2	80	1,300	24·6	2–1 prs.	2	21	10
155–157 (3 boats).. ..	Bordeaux ..	1893	118	13·2	8·7	2	80	1,300	23	2–1 prs.	2	21	10
158–160 (3 boats).. ..	Cail	1893	118	13·2	8·7	2	80	1,300	23	2–1 prs.	2	21	10
161–163 (3 boats).. ..	St. Nazaire..	1892	118	13·2	8·7	2	80	1,300	23	2–1 prs.	2	21	10
164–166 (3 boats).. ..	La Seyne ..	1892	118	13·2	8·7	2	79	1,300	23	2–1 prs.	2	21	10
167–169 (3 boats).. ..	Creusot ..	1892	118	13·2	8·7	2	81	1,300	23	2–1 prs.	2	21	10
170, 171 (2 boats).. ..	Normand ..	1893–4	118	13·2	8·7	2	80	1,300	23–2	2–1 prs.	2	21	10
172, 173 (2 boats).. ..	Normand ..	1893–4	118	13·2	8·7	2	89	1,390	23–24	2–1 prs.	2	21	10
174–176 (3 boats).. ..	Normand ..	1893–5	118	13·2	8·7	2	94	1,390	23–24	2 1-prs.	2	21	10
177–179 (2 boats).. ..	Havre.. ..	1893	118	13·2	8·7	2	79	1,300	23–24	2–1 prs.	2	21	10
180–187 (8 boats).. ..	Creusot, etc.	1893–4	118	13·2	8·7	2	80	1,300	23 4	2–1 prs.	2	21	10
188–191 (4 boats).. ..	Normand, etc.	1893–4	118	13·2	..7	..	79	..	24–2	..	2	21	10
192–194 (3 boats).. ..	Havre, etc.	1894–5	118	13·2	8·	2	82	1,300	23·55	2–1 prs.	2	21	10

* The Durandal, Hallebarde, Espingole and Fauconneau are classed as torpedo-gunboats in the list of cruising ships, etc.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—*continued.*													
195–200 (6 boats)	Havre, etc.	1894-5	319	13·2	8·7	2	80	1,300	23·5	2 1-prs.	2	21	10
201–205 (5 boats)	Havre	1897–8	121·4	13·6	..7	2	84	1,500	23·5	2–1 prs.	2	23	10
206–211 (6 boats)	Bordeaux ..	1897–8	121·4	13·6	..	2	86	1,500	23·5	2 1-prs.	2	23	10
212–215 (4 boats)	Havre	Bldg.	121·6	13·6	..	2	86	1,500	23·5	2 1-prs.	2	23	10
216–226 (11 boats) ..	{Cherbourg, Toulon, etc.}	Bldg.	121·6	13·6	..	2	86	1,500	23·5	2–1 prs.	2	23	10
227-234 (9 boats)	Bordeaux ..	Bldg.	121·4	13·2	8·7	2	84	1,500	23·5	2-1-prs.	2	23	10
P. 55–60	..	Pro.	121·4	13·2	3·7	2	84	1,500	23·5	2–1 prs.	2	23	10
SECOND CLASS—													
26	..	1878	108	11	5·6	1	45	400	19	2–1 prs.	2	16	10
27	..	1878	104·4	10·6	6·1	1	44	400	19	2–1 prs.	2	16	10
28	..	1878	111·5	11	5·6	1	44	400	19	2–1 prs.	2	16	10
60–64 (5 boats)	..	1878–85	108·2	10·3	6·1	1	45	400	19	2–1 prs.	2	16	10
65, 66, 68 (3 boats) ..	..	1878–85	108·2	10·7	6·4	1	49	500	20	2–1 prs.	2	16	10
69–74 (6 boats)	..	1878–85	108·2	10·7	6·5	1	50	500	20	2–1 prs.	2	16	10
75-82, 84–109 (34 boats)	Cail, etc. ..	1885–92	114·7	10·6	6	1	54	525	20	2–1 prs.	2	16	10
111–125 (12 boats) ..	La Seyne, etc.	1885–90	114·7	10·6	6	1	54	525	20	2–1 prs.	2	16	10
130–132, 134–144 (14 boats)*	Normand, etc.	1889–90	111·5	11·4	6	1	52·8	520	21	2–1 prs.	2	16	10
THIRD CLASS—													
8, 10–16, 18, 19 (10 boats)	Various Firms in France and England.	1877–82	86	10·2	5	1	27	200–450	16–19	..	..	10	
20			87	10·8	5	1	33			..	..	10	
22, 23 (2 boats)			87·6	10·4	5·2	1	30			..	..	10	
24, 25 (2 boats)			88·5	10·4	6	1	30			..	..	10	
31, 32 (2 boats)			85·5	10·4	3·8	1	27			..	..	10	
33–36 (4 boats)			89	10·4	6	1	32			..	..	10	
37–40 (4 boats)			87	10·8	5	1	32			..	..	10	
41, 42 (2 boats)			87	10·8	6	1	33			..	..	10	
43, 44 (2 boats)			89	10·4	5·7	1	32			..	..	10	
47			87	10·8	5	1	33			..	..	10	
48			89	10·4	5·8	1	32			..	..	10	
49, 50, 53 (3 boats) ..			87	10·8	5	1	32			..	..	10	
54, 55 (2 boats)			91	10	6·1	1	32			..	..	10	
VEDETTE BOATS—													
(1 boat) (aluminium) ..	Poplar ..	1894	62·3	9·1	..	1	14	210	20·5	..	1	8	
29, 30 (2 boats)	Chiswick ..	1876	67	8·5	3·5	1	16	..	18	..	1	8	
56, 57 (2 boats)	Chiswick ..	1879	59	7·5	3·5	1	12	50	16	..	1	8	
58, 59 (2 boats)	Chiswick ..	1881	63	7·5	3·5	1	11	50	17	..	1	8	
A B	Creusot ..	1894	62·4	8·9	4·9	1	15	210	16·5	..	1	9	
SUBMARINE—													
Gustave Zédé	Toulon ..	1893	131	..	..	1	266	720	14	..	1	8	
Gymnote	Mourillon ..	1888	59	5·9	5·9	1	30	60	4–6	..	..	4	
Morse	Cherbourg ..	Bldg.	168	..	..	..	146	..	13	..	1	9	

* Second-class boat No. 83 lost off Cape de la Chèvre, 1897, and No. 133 near Algiers, 1898.

Germany.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DIVISION BOATS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 1, D 2 (2 boats)	Elbing ..	1887	180·6	21·6	9·8	2	250	1,800	19	6 1-pr. revs.	3	48	50
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	{ 4 6-pr. Q.F. 2 1-pr. revs. }	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190·3	23	9·6	2	320	3,000	22½	{ 4 6-pr. Q.F. 2 1-pr. revs. }	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	?3	9·9	2	350	3,500	22½	6 Q.F.	3		
D 9, D 10 (2 boats)	Elbing ..	1894	197·0	24·3	9·9	2	380	4,500	26	6 Q.F.	3		
D 11	Chiswick ..	Bldg.	211·9	19·6	7·6	2	300	5,500	27½	5 3-pr. Q.F.	2		
1 boat†	..	Pro.	..	..	..	..	350						
FIRST CLASS—													
S 1—S 65 (64 boats)*	Elbing ..	1883–92	{121 150	15·7 15·6	6·7 6·7}	..	85–88	{900 1,600}	20–22½	2 1-pr. revs.	2	..	17
S 66—S 73 (10 boats)	Elbing ..	1893	154·3	16·4	..	2	{110 145}	1,600	..	..	3		
S 74—S 81 (8 boats)	Elbing ..	1894	154·3	16·4	..	2	125	1,900	25	..	3		
S 82—S 87 (6 boats)	Elbing ..	1897–8	152·6	..	..	2	140	2,300	26	2 1-pr. revs.	3	..	32
8 boats†	..	Pro.	..	..	..	..	125						
V 1, V 2 (2 boats)	Stettin ..	1884	124·6	..	..	..	{75	550}	..	..	2		
V 3, V 4 (2 boats)	Stettin ..	1884	..	..	..	..	90	1,000}	..	..	2		
V 5—V 10 (6 boats)	Stettin ..	1884	..	..	..	..			19	..	2		
G 1,	Gaarden ..	1885	124·6	15·7	6·6	..	88	1,000	19	2 1-pr. revs.	2	17	
Y 1,	Poplar ..	1884	120	12·5	5·5	1	65	650	19	2 1-pr. revs.	2	15	25
T 1, T 2 (2 boats)	Chiswick, &c.	1884	117·7	12·5	6·2	1	80	..	20·2	2 1-pr. revs.	2	15	22
H 1,	Kiel (Howaldt)	1886	..	..	..	..	80	1,000	20	2 1-pr. revs.	2		
K 1,	Kiel (Dockyard)	1887	118·1	13·4	5·9	..	85	1,000	22	2 1-pr. revs.	..	18	
SECOND CLASS—													
W 3—W 6 (4 boats)	Bremen ..	1884	103	12·8	..	..	..	650	18·5	2 1-pr. revs.	2	14	13
3 boats	..	1893	..	..	..	..	88	..	22				
2 boats	..	1893	..	..	..	..	90	..	3				
VEDETTE BOATS—													
13 boats	..	..	..	..	..	..	13·5	..	18				
2 boats	..	..	..	..	..	..	..	..	16				
1 boat	Chiswick ..	1884	63	8	4·3	1	..	..	15·5	1 mach.	2		

* S 41 lost 1895. † Estimates of 1898–9.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
6 boats	Stettin ..	1885	128	15·3	5·4	1	85	1,050	19	4 1-pr. revs.	..	20	20
6 boats	Poplar.. ..	1881	100	12	4·2	1	48	600	19	2 1-pr. revs.	2	12	9
4 boats	La Seyne ..	1880	72	13	5·5	1	52	225	..	..	..	..	10
5 boats	La Seyne ..	1881	89	11	3·1	1	35	500	17·5	..	..	..	5
2 boats	Poplar.. ..	1878	75	10·8	2·5	..	18	295	16·2	..	..	..	1·5
8 boats	..	..	..	..	..	..	21	..	16				
20 boats	Various ..	..	..	..	..	..	..	..	..	..	sp.	..	..

Italy.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYER—													
Fulmine	Sestri (Odero)	Bldg.	200	19·8	5·4	2	260	..	..	..	..	..	..
FIRST CLASS—													
5 boats {Aquila .., Sparviero, Nibbio .., Avvoltoio, Falco ..}	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	{2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.}	3	24	40
Nos. 78, 79 (2 boats)	Venice ..	1887	135	14	5·3	2	110	1,600	24	{1 1-pr. Q.F., 1 1-pr. rev.}	5	20	30
Pellicano	Sestri (Odero)	Bldg.	157·4	19	14·8	2	147	..	..	..	..	..	..
Condor	Sestri (Ansaldo)	Bldg.	154·3	16·8	6·9	2	136	2,400	27	2 3-prs.	2	27	..
SECOND CLASS—													
Nos. 76, 77 (2 boats)	Poplar.. ..	1887	140	14	5	2	100	1,600	25	{2 3-pr. Q.F., 1 1-pr. rev.}	5	20	30
Nos. 84–104, 106–111 (27 boats)	{Elbing and Italy ..}	1887–88	127·7	15·6	6·8	1	85	1,000	22·5	2 1-pr. Q.F.	2	17	7
Nos. 112–116, 118–135 (23 boats)	{Elbing and Italy ..}	1889–92	127·7	15·6	6·8	1	85	{1,100 1,200}	23	..	2	17	17
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–146 (11 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147–153 (7 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
12 boats	Italy	Bldg.	131·2	16·4	7	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 56–75 (20 boats)	{Elbing and Italy ..}	1885–87	127·7	15·6	6·8	1	65	1,000	22·5	2 1-pr. Q.F.	2	17	17
THIRD CLASS—													
No. 22	Poplar.. ..	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	10
No. 25	Poplar.. ..	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	10
Nos. 26–55 (30 boats)	{Chiswick and Italy ..}	1882–86	100	11·7	5·3	1	34	430	21·3	1 1-pr. rev.	2	11	7
Nos. 80–83 (4 boats)	Genoa	1888	101·6	..	..	1	34	430	21	1 1-pr. rev.	2	11	7
Nos. 23, 24 (2 boats)	Chiswick ..	1881	92	10·5	4·9	1	33	470	21·8	1 1-pr. rev.	2	11	7
No. 11	..	1883	..	..	..	1	31	250	..	..	..	10	
FOURTH CLASS.													
Veloce	Chiswick ..	1878	76	10	3·5	1	..	..	18	1 1-pr. rev.	..	10	
Nos. 1, 2 (2 boats)	Poplar.. ..	1879	86	11	4·5	1	25	420	21	..	..	10	7
Nos. 3–10, 16–18, 20, 21 (13 boats)	Chiswick ..	1883	63	7·5	2·5	1	13	170	16·5–17	1 1-pr. rev.	2	10	
Nos. 12–15 (4 boats)	Chiswick ..	1883	66	..	3·8	1	16	250	19·2	1 1-pr. rev.	2	10	
14 boats	E. Cowes ..	..	..	..	..		8–14	..	12–16	..	..	..	
SUBMARINE—													
Pullino	..	1893	..	..	..	..	..	..	8				
Audace	..	Bldg.	28·6	11·3	7·0	..	..	..	..	..	..	..	..
Delfino	Spezia	1895	49·0	..	..	..	..	..	10·0	..	..	..	..

Japan.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
4 unnamed	Chiswick ..	Bldg.	210·0	19·6	7·6	2	275	5,500	30	6 Q.F.	2	..	..
4 unnamed* .. .. / 4 unnamed	{Poplar.. .. / Elbing ..}	Bldg.	220·0	20·6	9·0	2	360	6,000	31	{1 12-pr., 5 6-pr. Q.F.}	2	56	90
Kotaka	Poplar.. ..	1886	170	19·6	5		190	1,400	19	4 mach.	6	..	
14 boats†	Creusot ..	1889	114·7	10·6	6	2	56	525	20	2 1-prs.	..	16	50
7 boats	Kobe	1889	114·7	10·6	6	1	56	525	20	2 1-prs.	..	16	
4 boats	Poplar.. ..	1879	100	12·5	..	1	40	620	20	..	..	..	
1 boat	Normand ..	1891	118	13·2	8·7	1	75	1,300	23	2 1-prs.	2	21	3
2 boats	Elbing ..	1891	128	16	..	2	90	1,300	23	3 1-prs.	3		10
10 boats	Kobe	Bldg.	..	..	..	1	..	..	..	..	..	..	24
5 boats	Havre	Bldg.	..	..	..	..	150	..	24	..	..	..	..
8 boats	Elbing ..	Bldg.	..	..	..	..	150	..	24	..	..	..	..

* Conning tower armoured. † No. 16 lost off the Pescadores, 1895.

The ten years' programme includes 23 first-class, 31 second-class, and 3_5 third-class torpedo-boats, and a 6750-ton torpedo transport.

Mexico.

Mexico has five first-class boats building or projected.

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardjoeno	Poplar.. ..	1886	125	13	6	1	83	800	21	2 1 prs	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Poplar.. ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
13 boats	..	pro.	160	..	..	..	..	..	..	..	..	..	..
4 boats	..	pro.	100	..	..	..	..	..	..	..	..	..	..
Second Class—													
Nos. 1, 2, 4–20 (19 boats)	Chiswick, etc.	1878–86	76 / 79	10·3	5·2	1	29	250	18	1 1-pr.	2 sp	..	3
Nos. 3.21,2 (3 boats)	..	1890	83·6	10·5	5·1	1	37	460	17·9	1 1-pr.	1	..	3
1 boat	East Cowes	1883	45·5	9·7	..	1	..	..	12	1 mach.	1		
Indian Fleet—													
Cerberus	Flushing ..	1888	125	13	6·9	1	83	912	21·2	2-1 prs.	2	16	
1 boat	..	1891											
3 boats	..	1893–94	125	..	..	..	83	..	21·5	..	2		

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Lyn	..	1882	94·2	9·7	2·5	1	36	430	18	..	1	..	3
Od	..	1882	97·5	11	5·6	1	40	450	18	..	1	..	3
Orm, Otter (2 boats)	..	1887	108·2	12·2	5·6	1	40	500	20	..	2	..	3
Pil, Rask (2 boats)..	..	1887	101·7	11·8	5·6	1	40	500	20	..	2	..	3
Snar	..	1887	104·9	11·8	5·6	1	40	500	20	..	2	..	3
Springer	..	1887	97·5	11·6	5·6	1	40	450	19	..	2	..	3
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	..	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	..	..	95	1,000	24·5	2 1·4-in.Q.F.	2	..	..
Second Class—													
Rasp	Chiswick ..	1873	58	7·5	3·9	1	16	..	18	..	2		
Ulven	..	1878	56	..	..	1	16	..	9	..	sp.		
2 boats	..	..	..	..	..	..	20	..	12	..	..		

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Espadarte (1)	Poplar.. ..	1881	85	11	5	1	31	450	19·7	2 mach.	2	10	10
Nos. 2, 3, 4 (3 boats)	Poplar.. ..	1886	120	12·5	5·5	1	60	700	20	2 mach.	2	16	18
Fulminante	Blackwall ..	1880	75	15	2·6	2	40	150	11·5	2 mach.	..	..	8
1 boat	..	..	..	..	..	..	25						
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				
SUBMARINE—													
Plongeur	..	1892	72·1	11·5	..	..	..	..	6				

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naluka	Havre	1888	120·7	11·3	6·9	1	55	500	21	1 1-pr. rev	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	..	500	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Szimul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	..	..	8	1
Vulturul	Poplar.. ..	1882	63	8	3	1	15	150	16·5	..	..	8	1

Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.													
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Sokol	Poplar.. ..	1895	190	18·6	7.0	2	240	4,400	29.7	1 12-pr. 3	2	..	60
24 Sokol type	Ijora	Bldg.											
2 Sokol type	Abo	Bldg.	..	..	..	..	..	..	..	6-pr.	..	..	..
2 Sokol type	St. Petersburg	Bldg.											
FIRST CLASS—													
Aspen	Kolpiro ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Abo	Elbing ..	1886	128	15·7	7·5	1	87	900	22·2	4 1-pr. revs.	2	13	17
Bjerke	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Dago	Abo	1891	152	13	8·3	..	100	1,000	19				
Domeness	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Eckness	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Hapsal	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Hogland	Ijora ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Kotka	Abo	1891	152	13	8·3	..	100	1,000	19				
Kotlinj	St. Petersburg	1885	124·2	12·9	5·9	2	67	500	16·5	2 1-pr. revs.	2	16	15
Kronschlot	Kolpiro ..	1891	152	13	8·3	..	100	1,000	19				
Lachta	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Libawa	Elbing ..	1886	128	15·7	7·5	1	87	1,000	22	4 1-pr. revs.	2	13	17
Louga	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17

Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Moonsund	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Nargen	Ijora	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Narwa	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Pernoff	Normand ..	1892	138	14·7	9·9	2	118	1,000	25·4	2 mach.	2	26	
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Seskar	Kolpiro ..	1891	152	13	8·3	..	100	1,000	19				
Sestoresk	Normand ..	1893	118	13·2	8·7	2	130	1,900	25	2 1-prs.	2	21	10
Tosna	Putiloff ..	1893	127·9	15·7	6·9	1	98	1,250	21	..	2	13	17
Transund	Kolpiro ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Viborg	Clydebank ..	1886	144·5	17	8·1	2	126	1,400	20	2 3-pr. revs.	3	24	45*
Vindawa	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Vzriw	St. Petersburg	1877	118	16	10·9	1	160	800	14·5	4 Q.F.	1	18	16
8 boats	St. Petersburg	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
2 boats	Putiloff ..	1894	138	14·7	9·9	2	118	..	25	2 mach.	2	26	
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
†8 boats	St. Petersburg	Bldg.	..	..	..	..	118						
3 boats	Nicolaieff ..	Bldg.											
SECOND CLASS—													
21 boats (Galka class)	Elbing and Russia ..	1880 &c.	74·7	8·9	5	1	30	220	16	..	2	14	3
21 boats (Woron class)	Elbing and Russia ..	..	66	11·1	..	1	..	260	17				
1 boat	Poplar.. ..	1888	60	8·5	3	1	16	240	17·5	..	2	..	1
Submarine (Pakaloff type)	Cronstadt ..	Bldg.	19	..	..	..	..	..	10				
BLACK SEA.													
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Batoum	Poplar.. ..	1880	100	12·5	5·5	1	40	500	22	2 1-pr. revs.	2	12	9
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
Gagri	Claparède ..	1883	120·6	13·3	7	1	78	600	18	2 1-pr. revs.	2	13	12
Gelendshik	La Seyne ..	1883	122·7	12·4	6·2	1	73	560	18	2 1-pr. revs.	2	13	11
Ismail	Nicolaieff ..	1886	128	15·7	7·5	1	87	900	20	2 1-pr. revs.	2	13	17
Itzvar	Odessa.. ..	1891	..	..	..	..	81	1,100					
Kodor	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Kilia	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Novorossisk	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Poti	Normand ..	1883	124·6	11·9	6·7	1	72	570	18·5	2 1-pr. revs.	2	13	11
Reni	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Sookhoum	Chiswick ..	1883	113	12·5	6	1	64	700	19.5	2 Nords.	2	13	10
Tchardak	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Yalta..	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
3 boats	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
6 boats	Nicolaieff ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..
SECOND CLASS—													
Istcheritza	Sebastopol ..	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Karabin	Elbing.. ..	1877	64·3	8·4	2	1	11	120	15	..	..	8	
Kefal..	Chiswick ..	1880	60·5	7·5	3·5	1	..	..	16·8	..	..	8	
Scheglensk	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Schehouka	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Scoombia	Odessa.. ..	1878	64·3	10	4	1	25	220	15	..	..	10	
Soroka	St. Petersburg	1878	62.3	9·7	3·9	1	24	220	15	..	..	10	
Soulin	..	1877	60	9·7	3·9	1	24	210	15	..	..	10	
Sultanka	Odessa.. ..	1878	64·3	10	4	1	25	220	15	..	..	10	
1 boat	Poplar	1877	75	10	..	..	..	..	..	..	..	..	
50 boats (Woron Class)	Elbing, etc.	..	66	11·1	..	1	..	260	17				
SIBERIAN FLOTILLA.													
Borgo	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Forel..	..	..	71·5	6·5	3·3	1	23	220	16				
Jantchiche	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
Podorosnik	..	..	71·5	6·5	3·3	1	23	220	16				
Revel	Normand ..	1886	152·3	12·3	8·1	1	96	780	22	2 Q.F.	2	23	30
Sisik	..	..	71·5	6·5	3·3	1	23	220	16				
Skorpion	..	..	71·5	6·5	3·3	1	23	220	16				
Sootchena..	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
Sterliad	..	..	71·5	6·5	3·3	1	23	220	16				
Strauss	..	..	71·5	6·5	3·3	1	23	220	16				
Sunguri (*ex* Hogland)	Abo	1890	152	16	7·9	2	140	1,800	22				
Sweaborg	Normand ..	1886	152·3	12·3	8·1	1	96	780	19·7	2 Q.F.	..	..	30
Ussuri (*ex* Nargen)	Abo	1890	152	16	7·9	2	140	1,800	22				

* Has received liquid fuel apparatus. † Of the Pernoff type building on the Neva.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Furor .. .. .. / Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 2 1-pr.	2	67	100
Audaz .. .. .. / Osado .. .. .. / Plutón .. .. .. / Proserpina	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 2 1-pr.	2	70	90
FIRST CLASS—													
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·1	2 mach.	2		
Ariete	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	26·1	4 3-pr. Q.F.	2	..	25
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Barcelo	Normand ..	1886	126	10·9	..	..	66	800	19·5	2 1-in. Nord.	2		
Bustamente	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-prs.	2		
Ejercito	Kiel	1887	111·5	13	3·3	..	60	1,000	25	2 mach.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·3	1 mach.	2		
Halcon	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Julian Ordoñez ..	Chiswick ..	1885	117·7	12·5	6·2	1	65	660	20·1	2 1-in. Nord.	2		
Orion..	Gaarden ..	..	125	15·5	3·5	1	85	1,000	21·5	2 1-pr. revs.	2	18	16
Rayo..	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	25·5	4 3-pr. Q.F.	2	..	25
Retamosa..	Poplar.. ..	1886	118	12·5	5·5	1	70	700	20·5	2 1-in.	2	17	20
Rigel..	Bremen ..	1883	105	12·3	3·3	1	57	..	19	1 1-pr. rev.	2	18	13
Seza	Ferrol.. ..	1885	126	..	..	..	85	..	14				
4 boats	..	Bldg.	147	43.0	5	..	98	1,600	25			25	25
2 boats	Clydebank ..	Bldg.	..	..	..	..	..	..	28				
SECOND CLASS—													
Aire	Spain	1883	43·4	10·2	3	2	25	175	8	1 3·1-in.	..	16	1
Castor	La Seyne ..	1878	76·2	9·7	2·3	..	23	265	19	..	..	14	1·5
Pollux	Poplar.. ..	1879	84·5	10·7	4·6	..	33	450	19·5	..	2	14	9
VEDETTE BOATS—													
3 boats	East Cowes	1892	60	9·3	..	..	..	..	18·3				
Peral..	Carraca ..	1889	70	8·5	..	2	87	60	10				

Sweden.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
3 boats	Stockholm ..	1886	114·4	12·4	6·4	1	60	600	18	1 mach.	2	12	15
Hugin (1)	Chiswick ..	1884	113	12·5	6·2	1	65	620	19·2	1 mach.	2	12	11
Nos. 9 (Gondul), 11 (Gudur)	..	1893	..	..	..	..	..	..	..	2 mach.	2		
Komet	Elbing ..	1896	128	..	..	..	90	1,000	24·5				
SECOND CLASS—													
Agda (77)	Carlskrona..	1891	100·4	11·3	5·8	1	40	450	19	1 mach.	2	12	7·5
Agne (75)	Stockholm ..	1891	100·4	11·3	5·8	1	40	450	19	1 mach.	2	12	7·5
Blink (61)	Stockholm ..	1882	91·5	11·7	5·2	1	34	350	16	..	1	10	8
Blixt (63)..	..	1883	100·4	11·6	5·4	1	40	360	18	..	2	12	7
Bygve (71)	Stockholm ..	1889	103·2	11·6	5·8	1	41	360	18	..	2	12	9
Bylgia (73)	Stockholm ..	1889	103·2	11·6	5·8	1	41	360	18	..	2	12	9
Galdr (65)	Stockholm ..	1885	100·4	11·6	5·4	1	40	425	18·5	..	2	12	7·5
Narf (67)..	Stockholm ..	1886	101·2	11·6	5·7	1	40	450	19	..	2	12	7·5
Nörve (69)	Stockholm ..	1886	101·2	11·6	5·7	1	40	450	19	..	2	12	7·5
Rolf	Stockholm ..	1882	91·5	11·7	5·2	1	34	390	17	..	1	10	8
Seid	Chiswick ..	1882	100	12	5	1	40	360	20·7	1 mach.	2	12	8
THIRD CLASS—													
Nos. 141, 143, 145, 147, 149, 151 (6 boats)	Stockholm ..	1879–90	55	10·7	4·1	2	21	80	10	..	2	..	1·5
Glimt (101)	Chiswick ..	1875	58	7·6	3	1	5	60	18	..	2	..	1·5

Turkey.

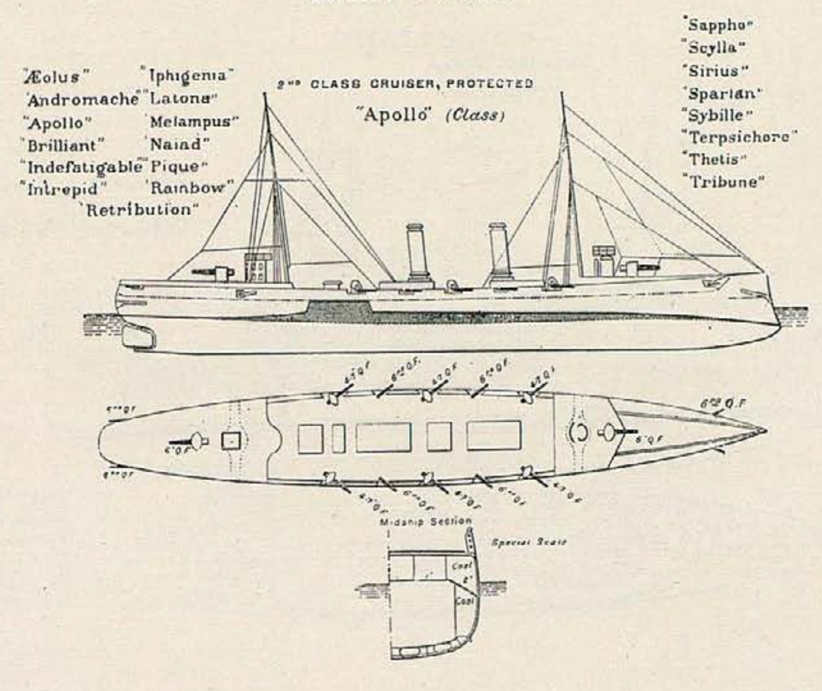
Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Gaarden ..	1894	187	21·6	..	2	270	200	25	6 1-pr. revs.	2		
Tajjar	Gaarden ..	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
FIRST CLASS—													
Edjder (No. 10) ..	Gaarden ..	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
1 boat	Constantinople	1889	140	16	6·9	2	120	1,800	23	5 1-pr. revs.	2		
5 boats	Gaarden ..	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
Timsah	London ..	1887	126	15	..	..	..	..	21·7				
5 boats	Elbing ..	1886	120·3	16·2	..	..	85	900	21	2 Nords.	2	20	10
4 boats	Constantinople	1886–89	100·3	11·8	5·5	1	42	550	19·5	2 mach.			
Tewfik	Normand ..	1885	100·7	13	5·5	1	42	550	20				
2 boats	La Seyne and Constantinople	1885	100·7	13	5·5	1	42	550	20·3	2 Nords.			
2 boats	Teddington	1887	124	15	..	..	..	..	22				
2 boats	Kiel	1892	127	..	..	..	..	..	22				
SUBMARINE—													
Abdul Hamid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8
Abdul Medjid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8

United States.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Porter (6)	Bristol, R.I.	1896	175	17	5·6	2	..	3,500	28·63	4 1-pr.	3	32	76
Du Pont (7)	Bristol, R.I.	1897	175	17	5·6	2	..	3,500	[27·5]	4 1-pr.	3	32	76
Rowan (8)	Seattle, Wash.	..	170	17	5·115	2	182	3,200	[26]	4 1-pr.	3	32	60
Farragut (11)	San Francisco	..	210	20·4	6	2	273	5,600	[30]	4 6-pr.	2	..	76
Stringham (19) ..	Wilmington, Del. ..	..	225	22	6	2	340	7,200	[30]	7 6-pr.	2	40	120
Goldsborough (20) ..	Portland, Ore.	..	191·8	20·5	5	2	247·5	6,000	[30]	4 6-pr.	2	35	131
Bailey (21)	Morris Heights N.Y. ..	..	205	19	6	2	235	5,600	[30]	4 6-pr.	2	40	50
SEA-GOING—													
Cushing (1)	Bristol, R.I.	1890	138·9	14·3	4·103	2	105	1,720	22·5	3 1-pr.	3	23	36
Ericsson (2)	Dubuque, Ia.	1894	149·7	15·6	4·9	2	120	1,800	[24]	4 1-pr.	3	23	35·4
Foote (3)	Baltimore ..	1896	160	16·1	5	2	142	..	24·53	3 1-pr.	3	24	43
Rodgers (4)	Baltimore ..	1896	160	16·1	5	2	142	2,000	[24·5]	3 1-pr.	3	24	42
Winslow (5)	Baltimore ..	1897	160	16·1	5	2	142	2,000	[24·5]	3 1-pr.	3	24	42
Dahlgren (9)	Bath, Me. ..	..	147	16·45	4·75	2	146·4	4,200	[30·5]	4 1-pr.	2	..	32
T. A. M. Craven (10)	Bath, Me. ..	..	147	16·45	4·75	2	146·4	4,200	[30·5]	4 1-pr.	2	..	32
Davis (12)	Portland, Ore.	..	146	15·4	5·4	2	132	1,750	[22·5]	3 1-pr.	3	..	..
Fox (13)	Portland, Ore.	..	146	15·4	5·4	2	132	1.750	[22·5]	3 1-pr.	3	..	..
Morris (14)	Bristol, R.I.	..	138·3	15·6	4·35	2	103	1,750	[22·5]	3 1-pr.	3	..	28
THIRD CLASS—													
Talbot (15)	Bristol, R.I.	1897	98	12·6	3·3	1	46·5	850	[20]	1 1-pr.	2	..	..
Gwin (16)	Bristol, R.I.	1897	98	12·6	3·3	1	46·5	850	[20]	1 1-pr.	2	..	..
Mackenzie (17) ..	Philadelphia	..	99·3	12·9	4·3	1	65	850	[20]	1 1-pr.	2	..	15·3
McKee (18)	Baltimore ..	..	99·3	12·9	4·3	1	65	850	[20]	1 1-pr.	2	..	15·3
Stiletto (wooden) ..	Bristol, R.I.	1886	88·6	11	3	1	31	359	18·22	none	2	..	4
SUBMARINE—													
Plunger	Baltimore ..	1897	85·3	11·6	..	2	168	1,200	[15] above / [8] below	none	2	..	..
1 boat (Holland) ..	New York ..	1897	80	11·0	..	2	118*	1,800	13½ / 16½ sub.	..	2	..	..

* 133 tons awash, 138½ tons submerged.

GREAT BRITAIN



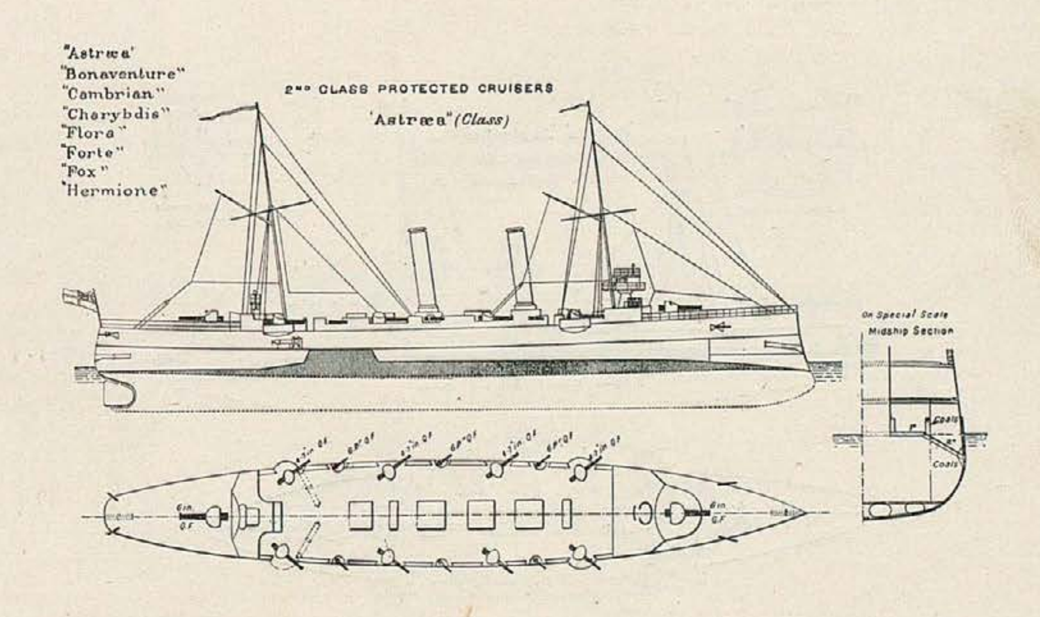
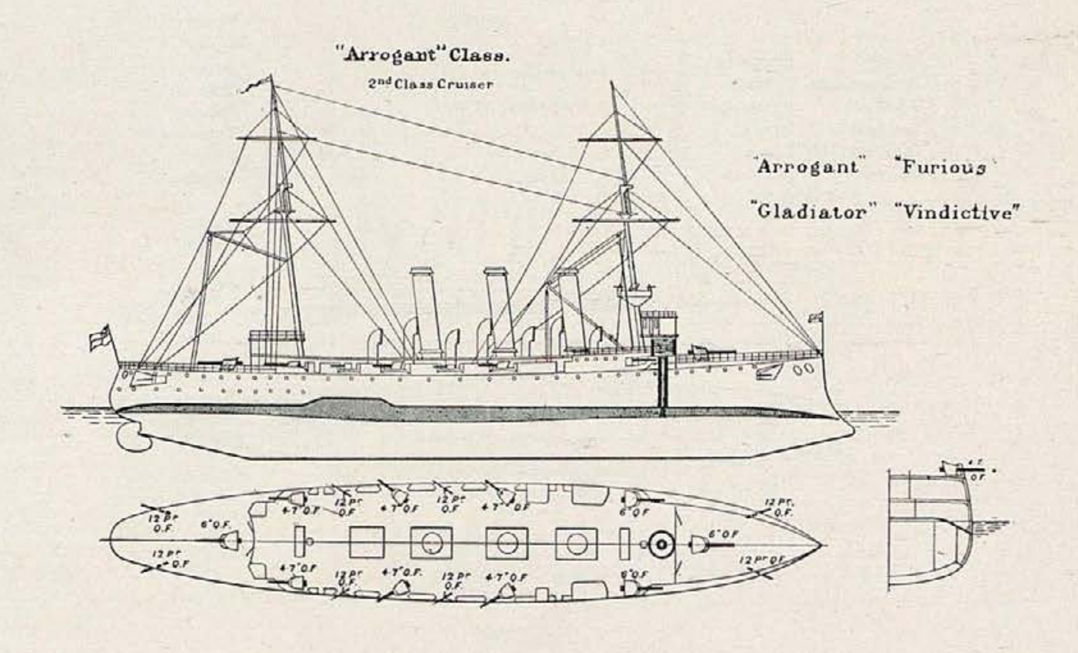
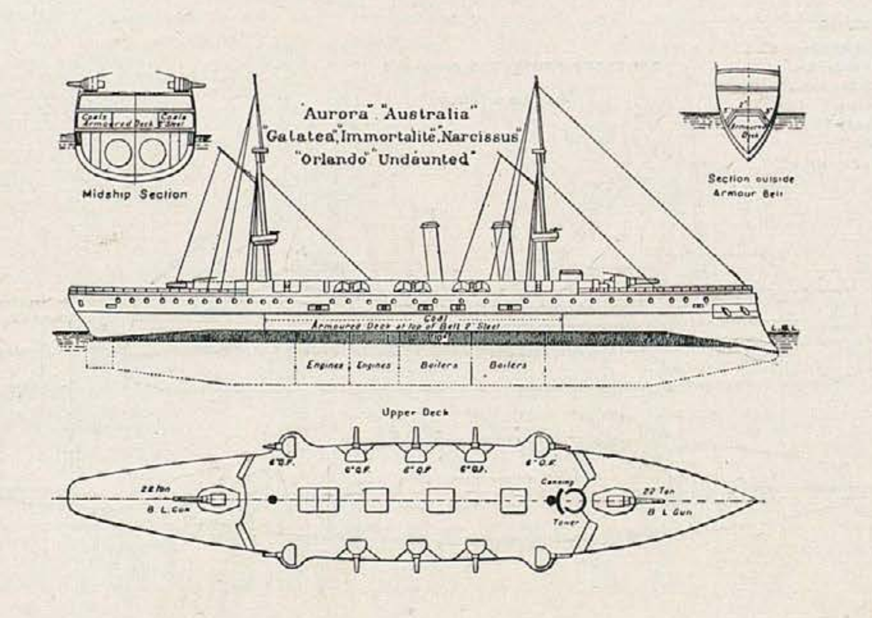


Plate 1.

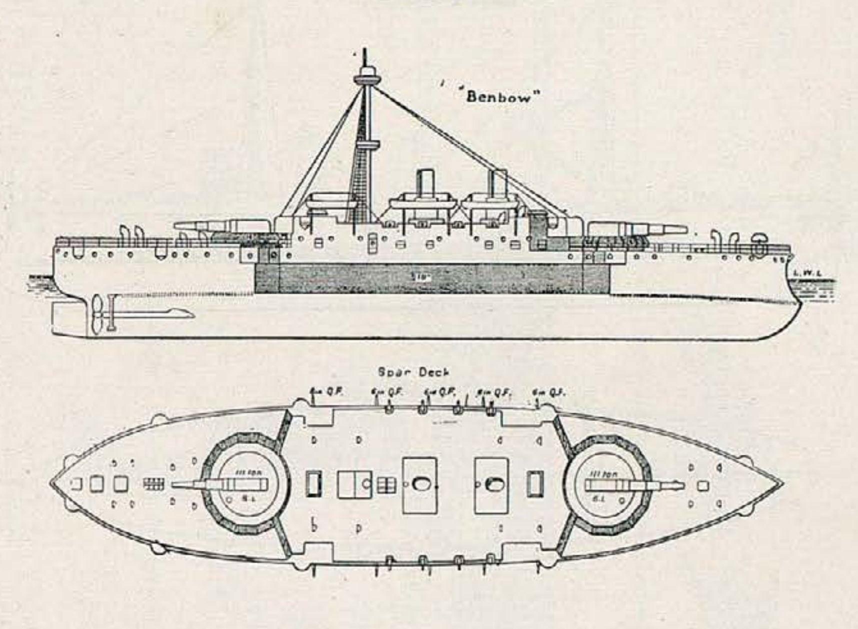
a

GREAT BRITAIN





GREAT BRITAIN



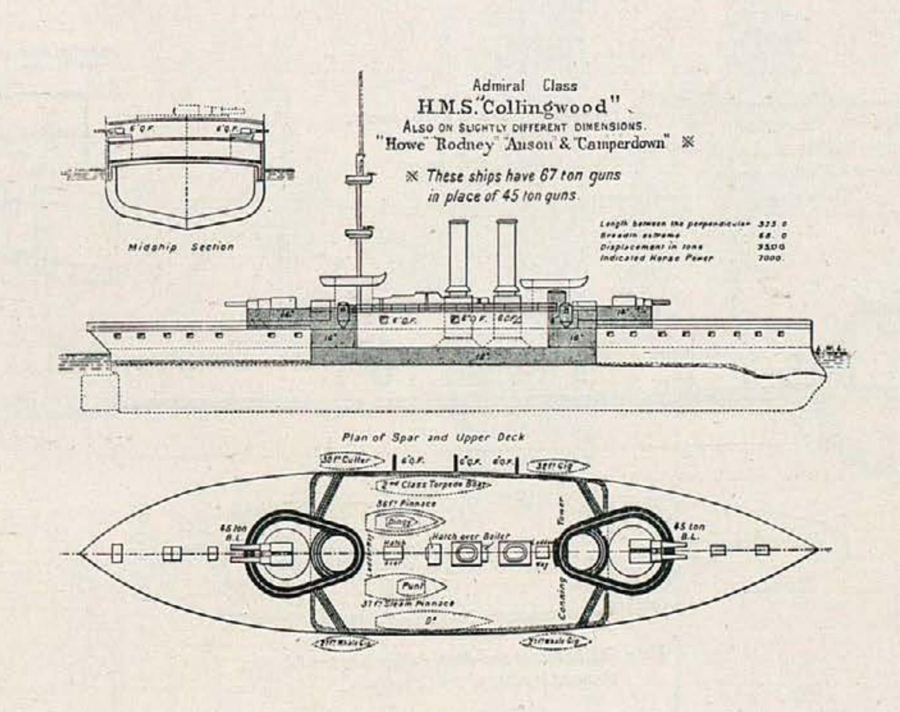
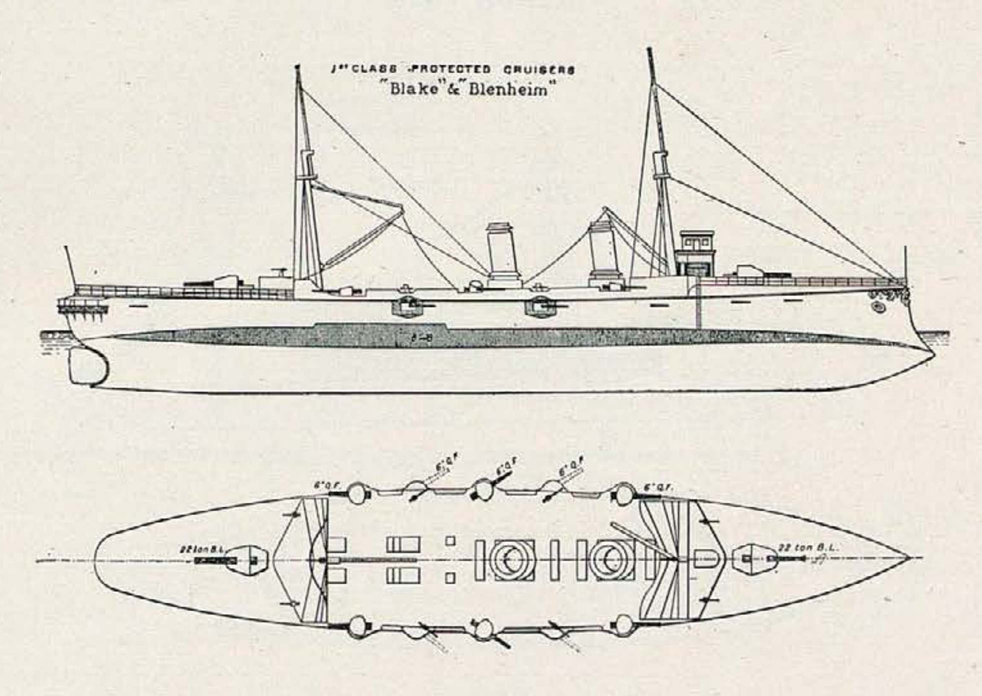
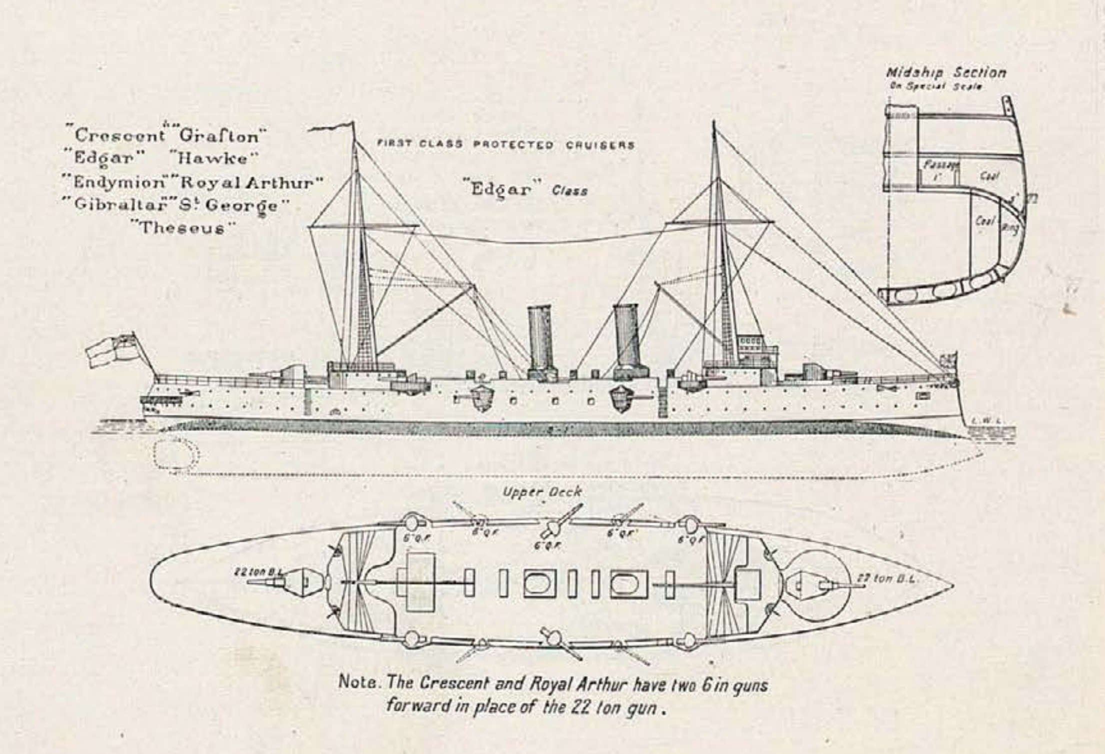


PLATE 3.

GREAT BRITAIN





Note. The Crescent and Royal Arthur have two 6 in guns forward in place of the 22 ton gun.

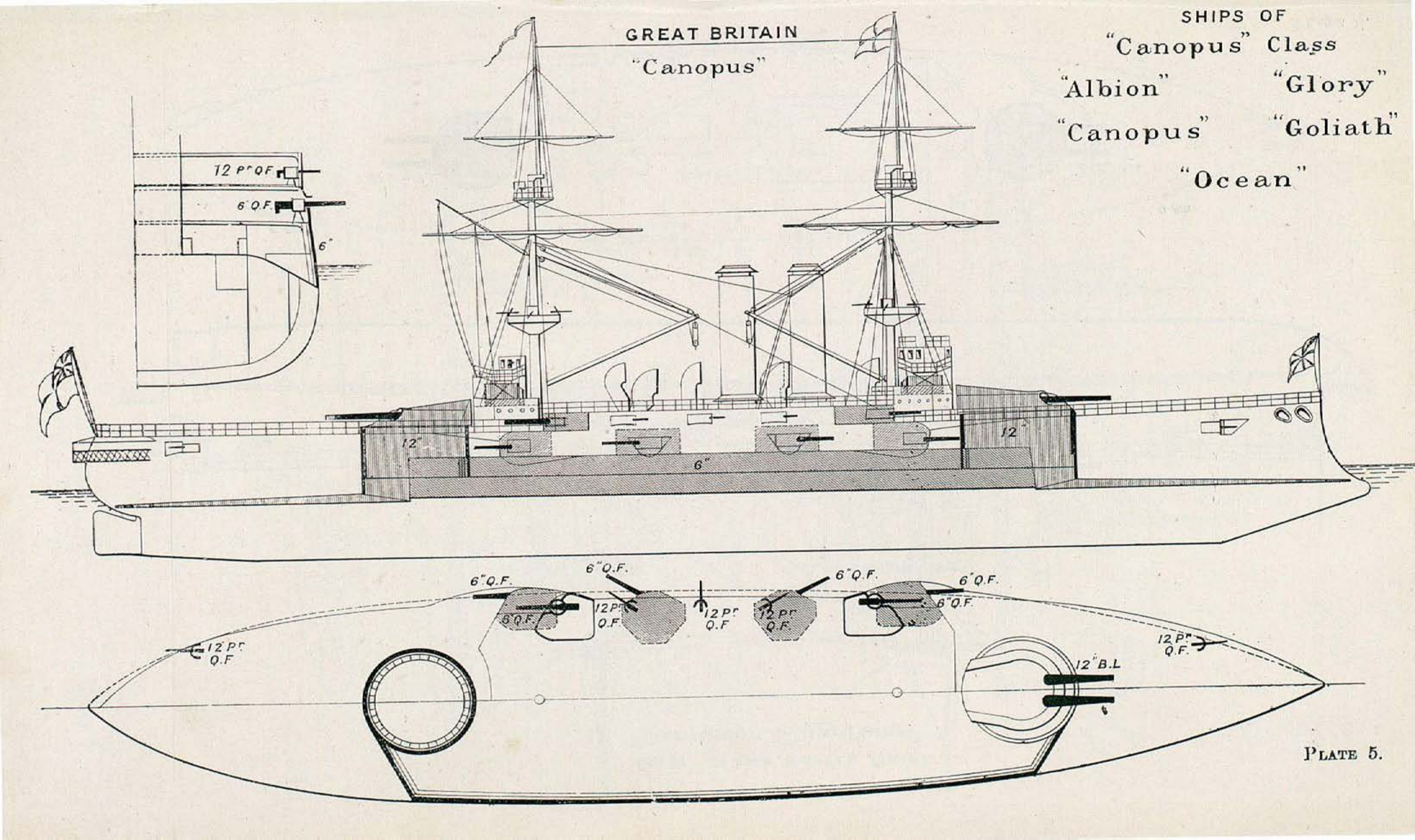

GREAT BRITAIN
"Canopus"
SHIPS OF
"Canopus" Class
"Albion" "Glory"
"Canopus" "Goliath"
"Ocean"
12 Pr Q.F.
6" Q.F.
6"
12"
6"
12"
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
12 Pr Q.F.
12 Pr Q.F.
12 Pr Q.F.
12 Pr Q.F.
12 Pr Q.F.
12" B.L

PLATE 5.

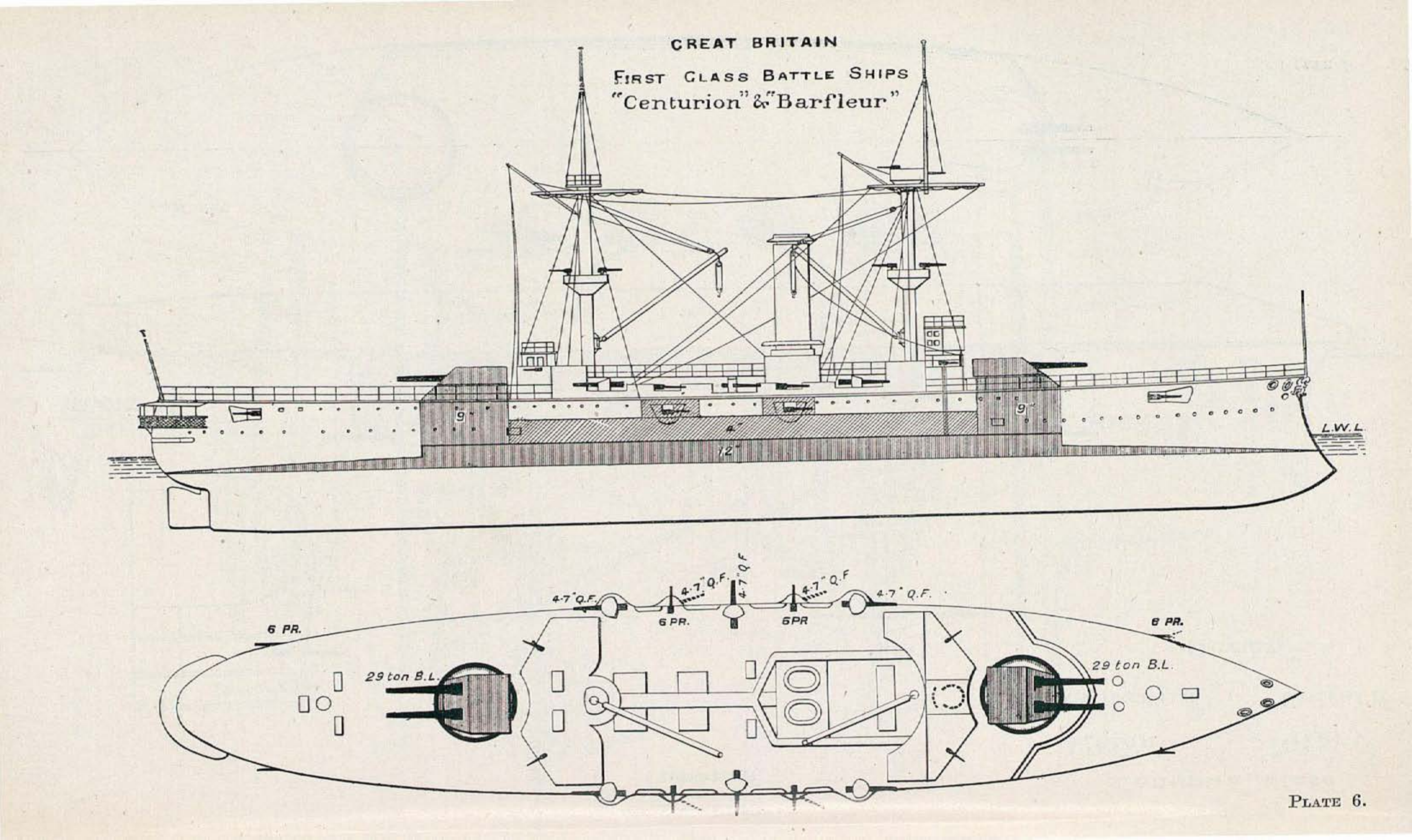
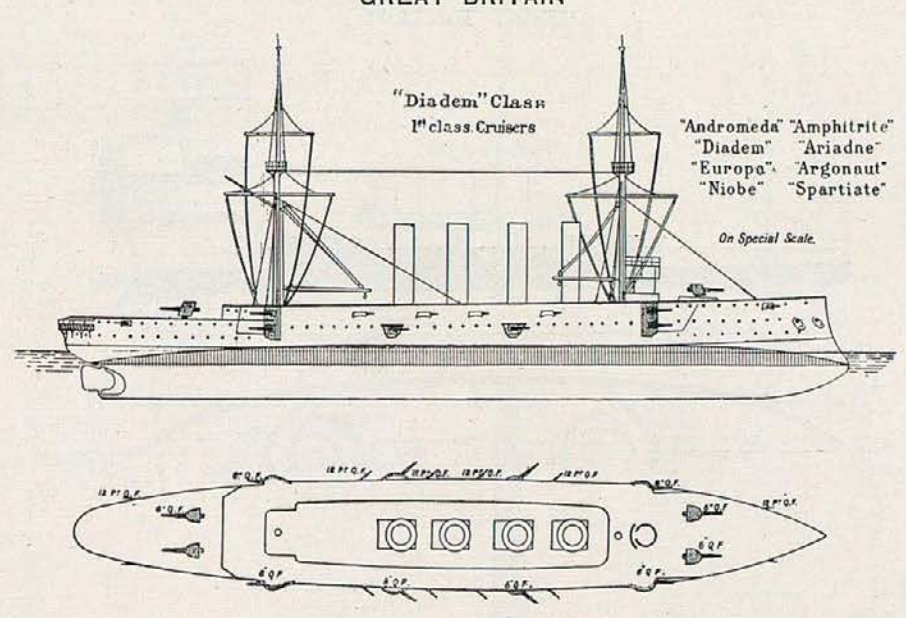

CREAT BRITAIN
FIRST CLASS BATTLE SHIPS
"Centurion" & "Barfleur"
9"
9"
4"
12"
L.W.L.
6 PR.
4·7" Q.F.
4·7" Q.F.
4·7" Q.F
4·7" Q.F
4·7" Q.F.
6 PR.
6PR
6 PR.
29 ton B.L.
29 ton B.L.

PLATE 6.

GREAT BRITAIN



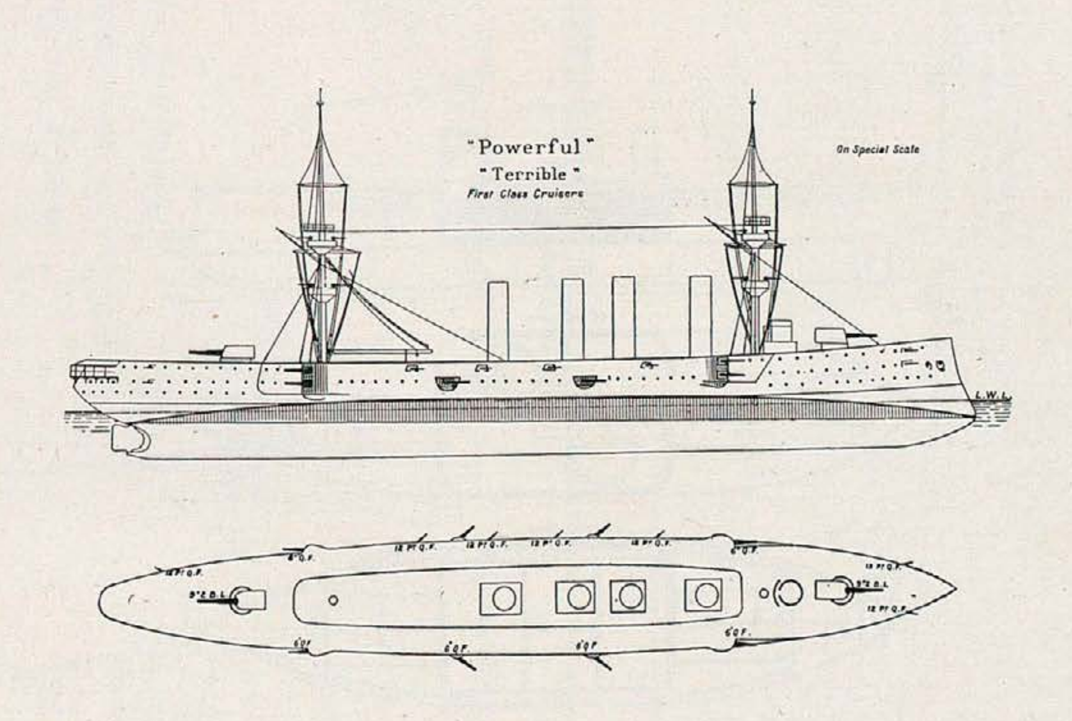
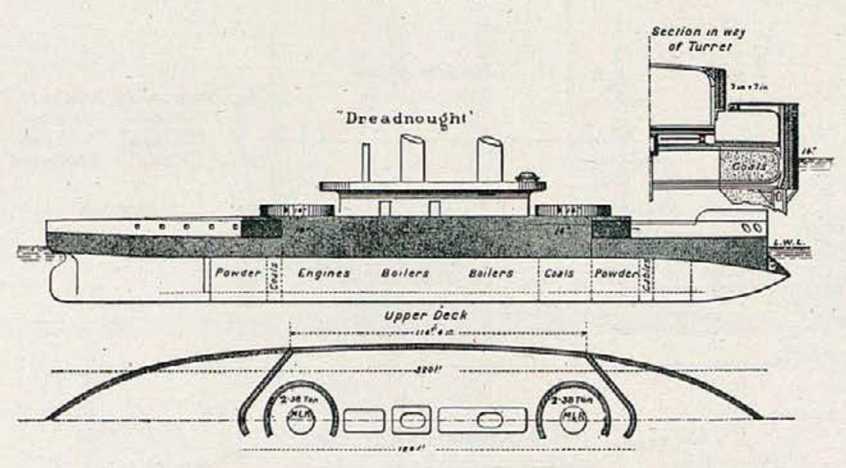


PLATE 7.

GREAT BRITAIN



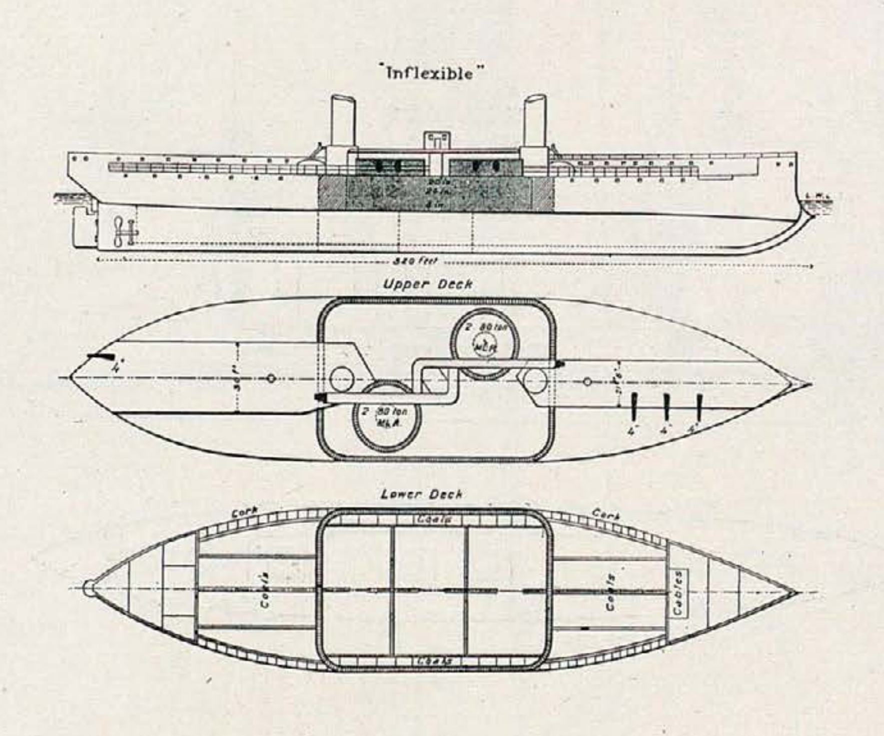


PLATE 8.

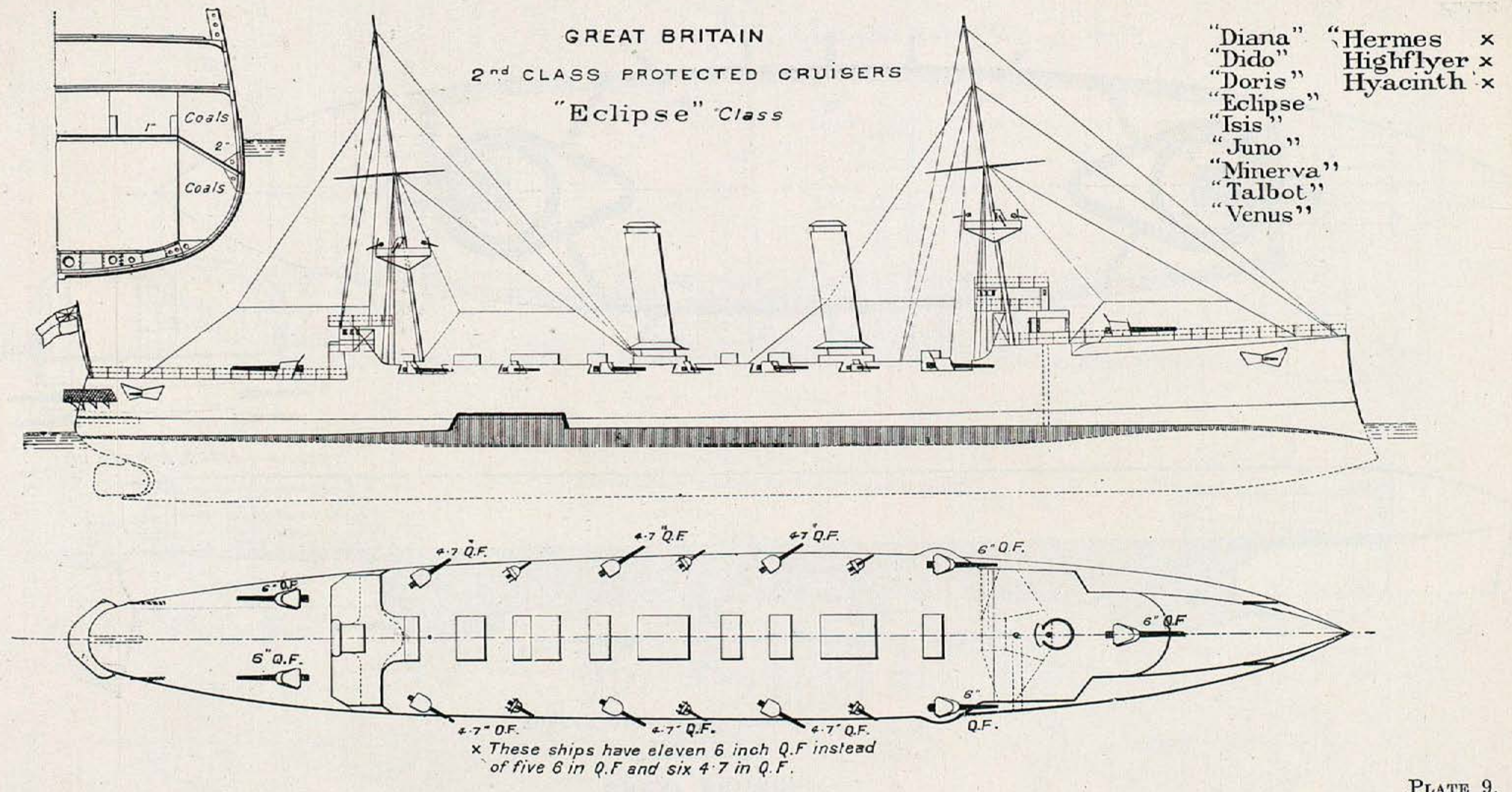

GREAT BRITAIN
2nd CLASS PROTECTED CRUISERS
"Eclipse" Class
"Diana"
"Dido"
"Doris"
"Eclipse"
"Isis"
"Juno"
"Minerva"
"Talbot"
"Venus"
"Hermes ×
Highflyer ×
Hyacinth ×
Coals
1"
2"
Coals
4·7" Q.F.
4·7" Q.F.
4·7" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
6"
Q.F.
4·7" Q.F.
4·7" Q.F.
4·7" Q.F.
× These ships have eleven 6 inch Q.F instead
of five 6 in Q.F and six 4·7 in Q.F.

PLATE 9.

GREAT BRITAIN

"Hood"

TURRET SHIP WITH REDOUBTS

18"
17"
6"
10"
18
17

On Special Scale

6" Q.F.
6" Q.F.
6" Q.F.
6. Q.F.
6" Q.F.

67 ton B.L.

67 ton B.L.

GREAT BRITAIN

"Imperieuse" "Warspite"

Armoured Deck at top of Belt 1½ in. Steel

L.W.L.

8"

Coals

10"

9"

Coals

Boilers

Engines

Boilers

Note. The 6 in guns in Imperieuse are Q.F.

Upper Deck

Coals

Armoured Deck 3 in. Steel

Section Outside Armour Belt

Armoured Deck

Coals

Coals

Coals

Coals

Midship Section

6" B.L.

8"

22 ton B.L.

6" B.L

6" BL

22 ton B.L.

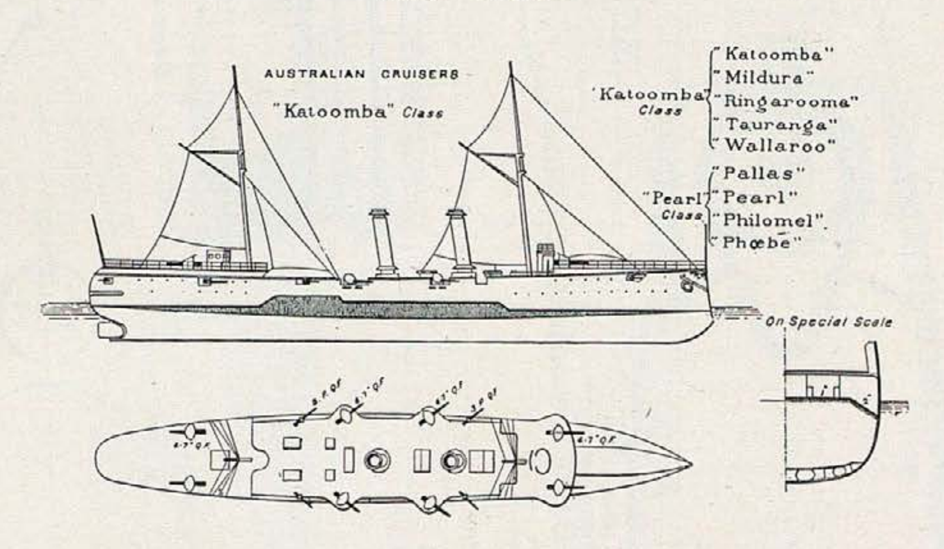
6" B.L

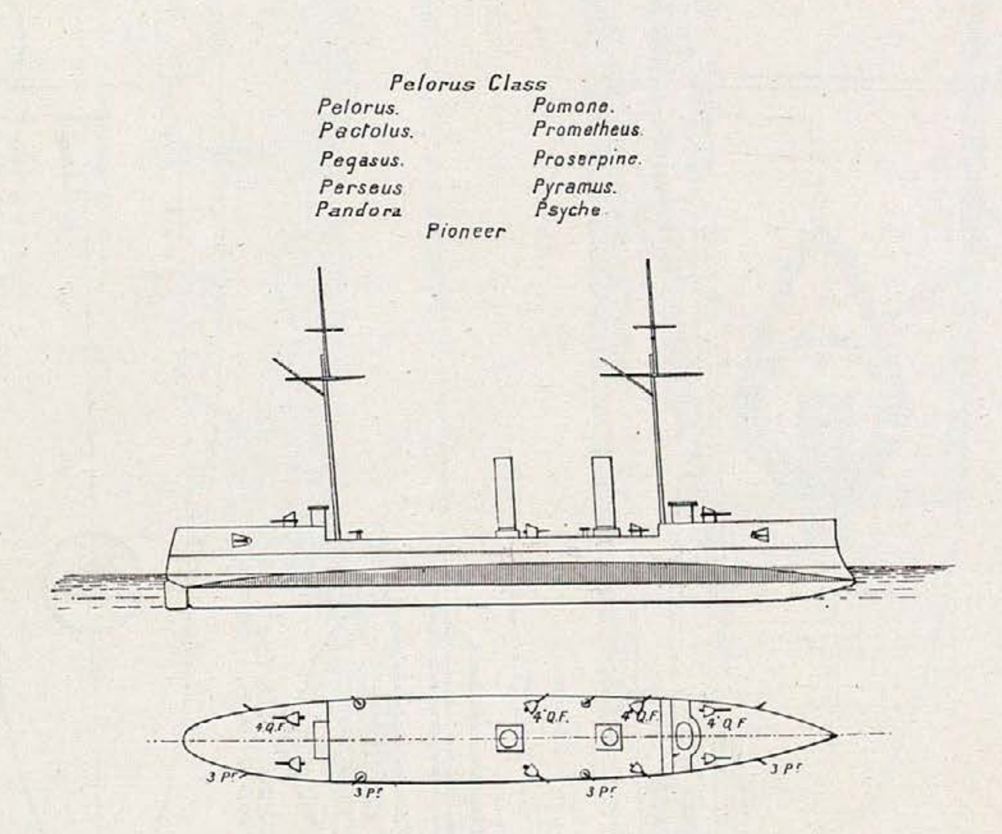
6" B L

8"

22 ton B.L.

GREAT BRITAIN





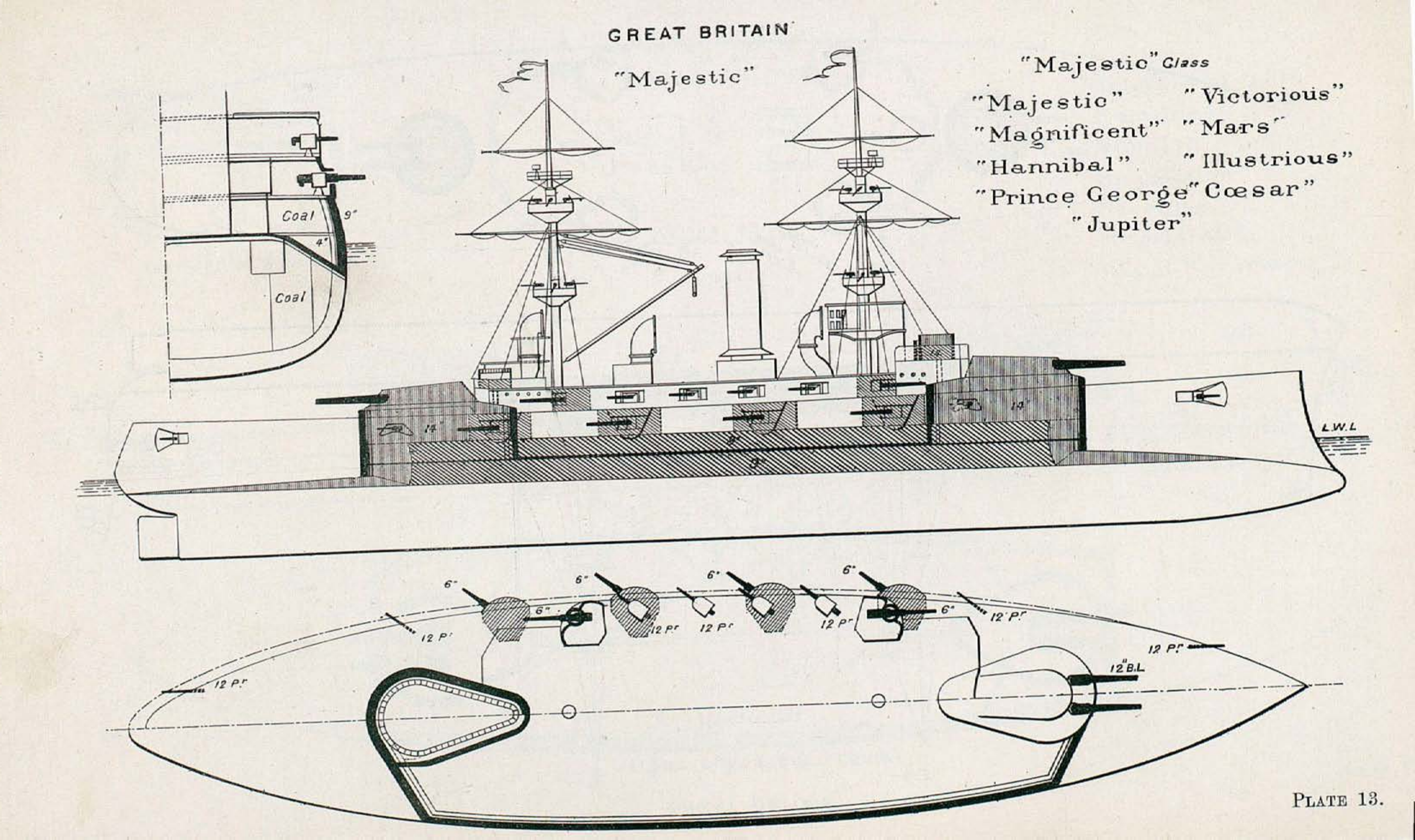

GREAT BRITAIN
"Majestic"
"Majestic" Class
"Majestic"
"Victorious"
"Magnificent"
"Mars"
"Hannibal"
"Illustrious"
"Prince George"
"Cœsar"
"Jupiter"
Coal
9"
4"
Coal
14"
14"
L.W.L
6"
6"
6"
6"
6"
6"
12 Pr
12 Pr
12 Pr
12 Pr
12 Pr
12 Pr
12 Pr
12"B.L

PLATE 13.

GREAT BRITAIN

FIRST CLASS BATTLESHIP

"Renown"

10"
10"
6"
8"
L.W.L

6" Q.F
12 Pr Q.F.
12 Pr Q.F.
6" Q.F.
12 Pr Q.F.
12 Pr Q.F
6" Q.F.
6" Q.F.
6" Q.F.
10" 29 ton
10" 29 ton

Plate 14.

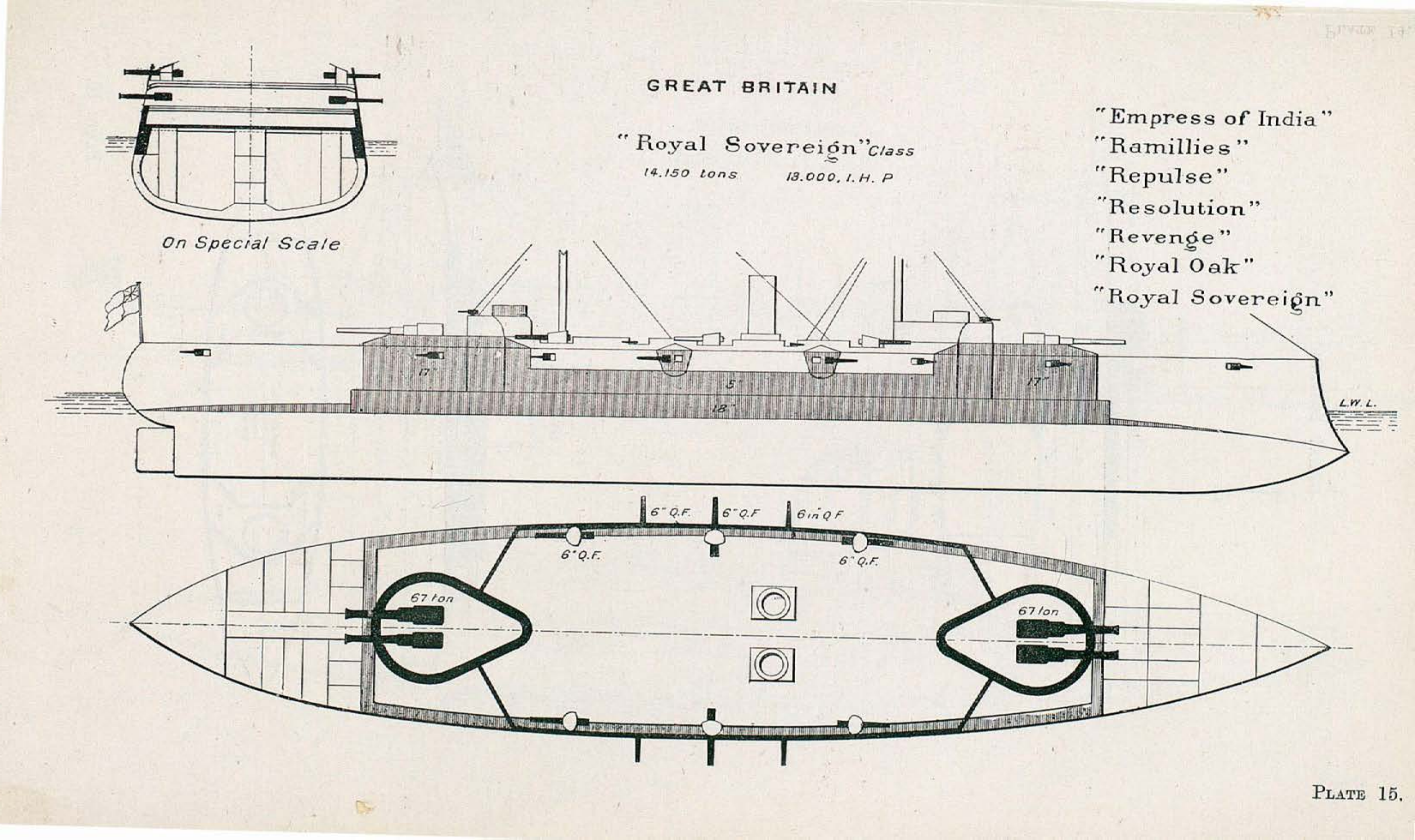
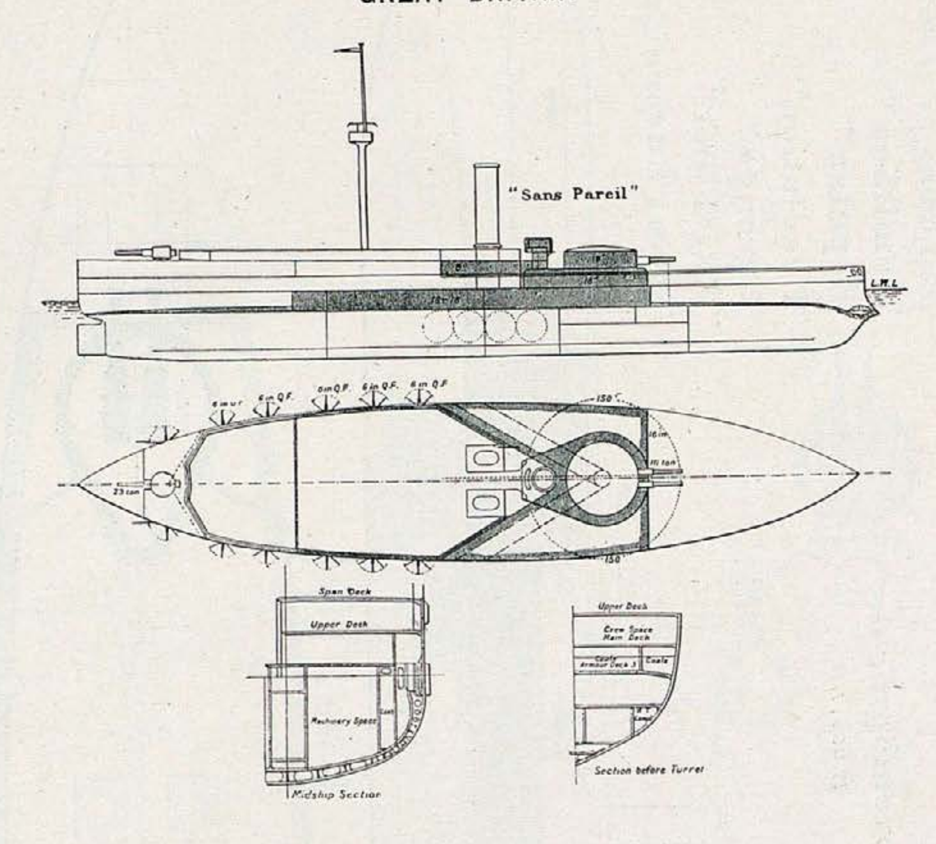
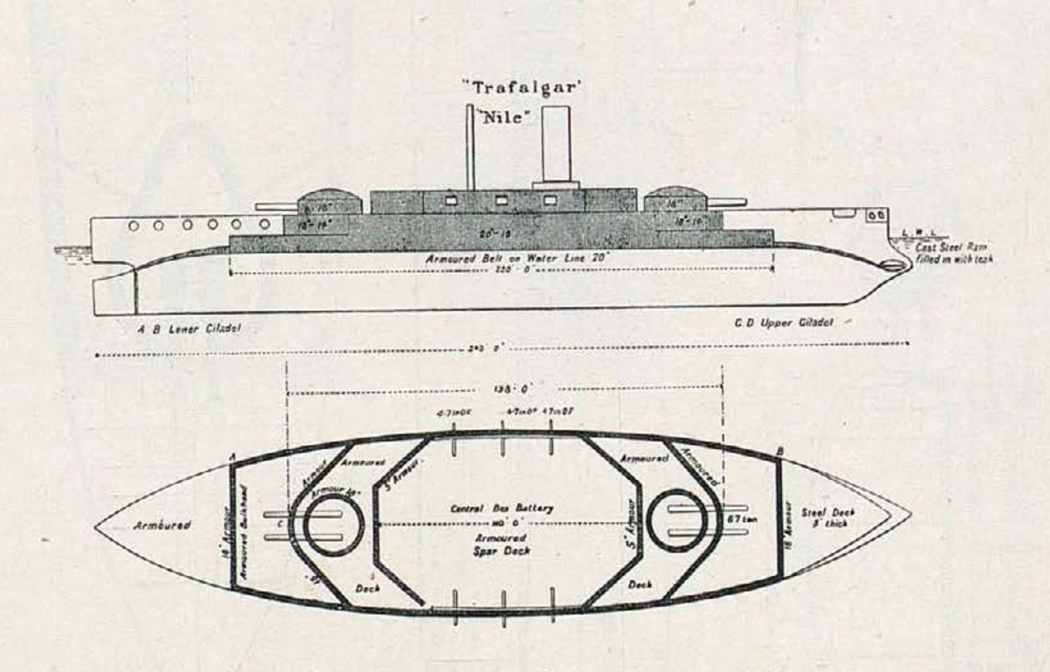

GREAT BRITAIN
"Royal Sovereign" Class
14.150 tons
13.000. I. H. P
"Empress of India"
"Ramillies"
"Repulse"
"Resolution"
"Revenge"
"Royal Oak"
"Royal Sovereign"
On Special Scale
17"
5"
18"
17"
L.W. L.
6" Q.F.
6" Q.F
6 in Q F
6" Q.F.
6" Q.F.
67 ton
67 ton

PLATE 15.

GREAT BRITAIN





ARGENTINA

PROTECTED CRUISER

"Buenos Aires."

L.W.L.

6" Q.F.

4·7" Q.F.

4·7" Q.F.

4·7" Q.F.

6" Q.F.

8"

8"

6" Q.F.

4·7" Q.F.

4·7" Q.F.

4·7" Q.F.

6" Q.F.

b

Plate 17.

ARGENTINA.

"Libertad" & "Independencia".

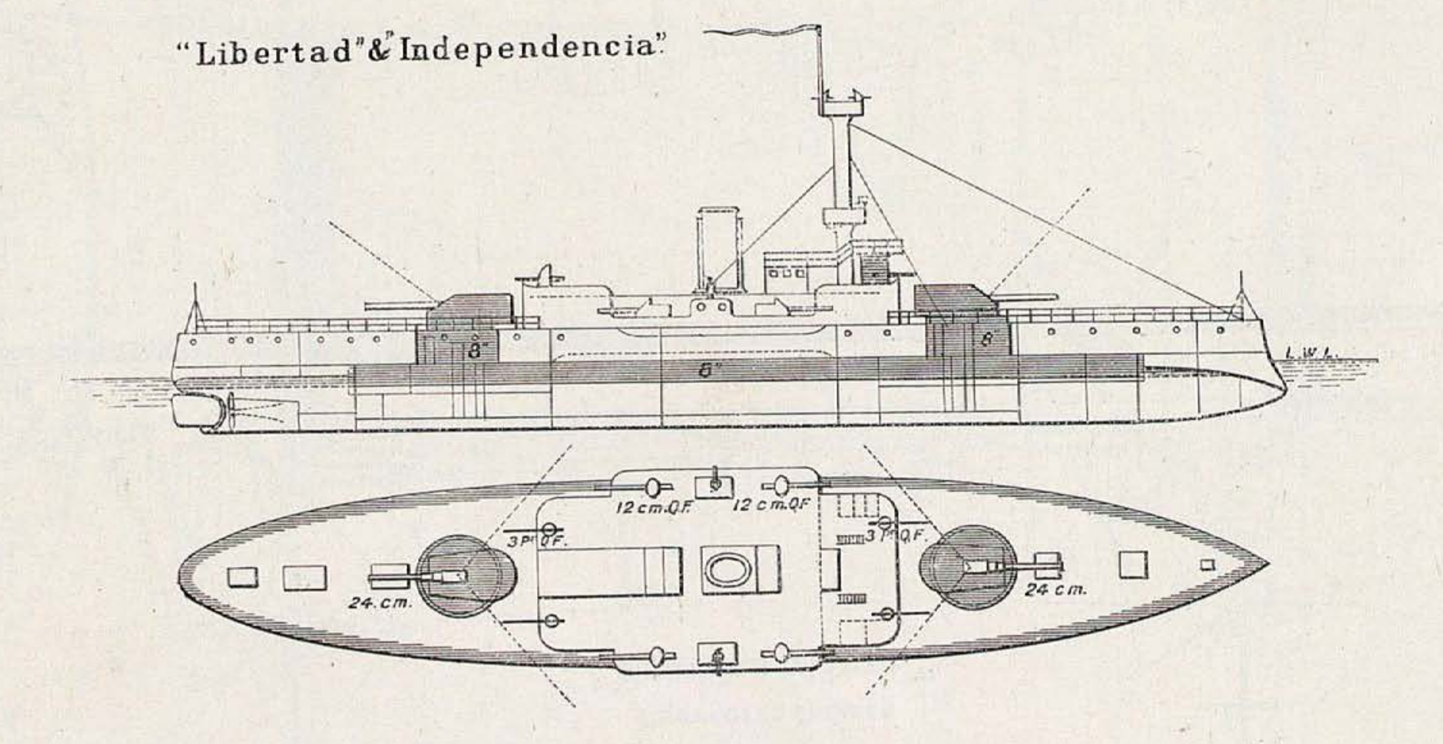


Plate 18.

ARGENTINA.

"Nueve de Julio."

L.W.L.

4½"–1½"

6 in Q.F.

4·7 in Q.F.

4·7 in Q.F.

4·7 in Q.F.

6 in Q.F.

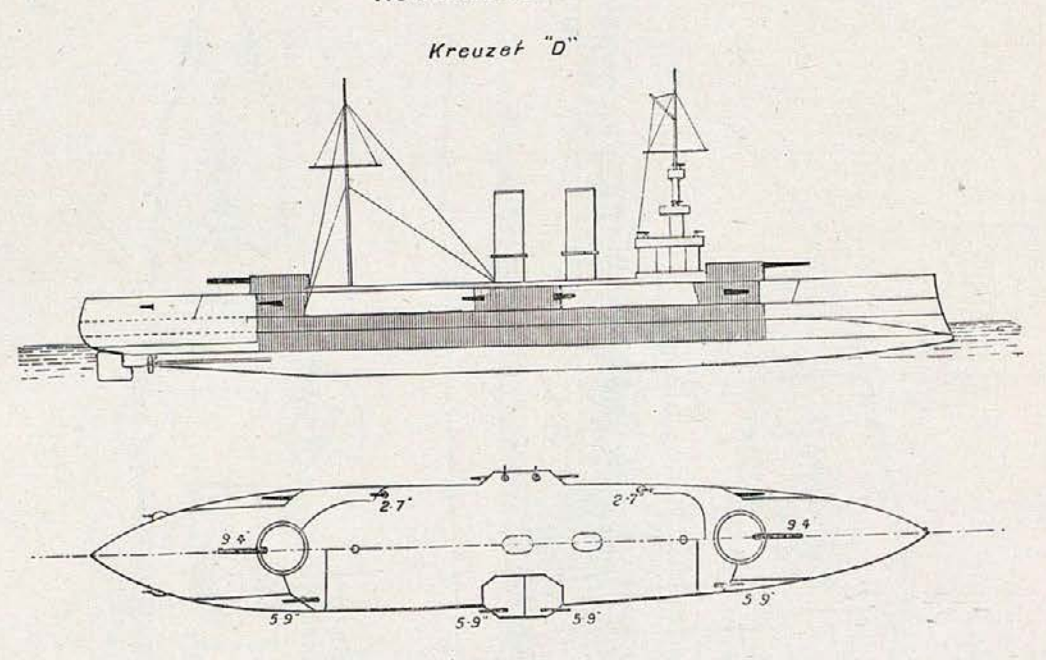
6 in Q.F.

6 in Q.F.

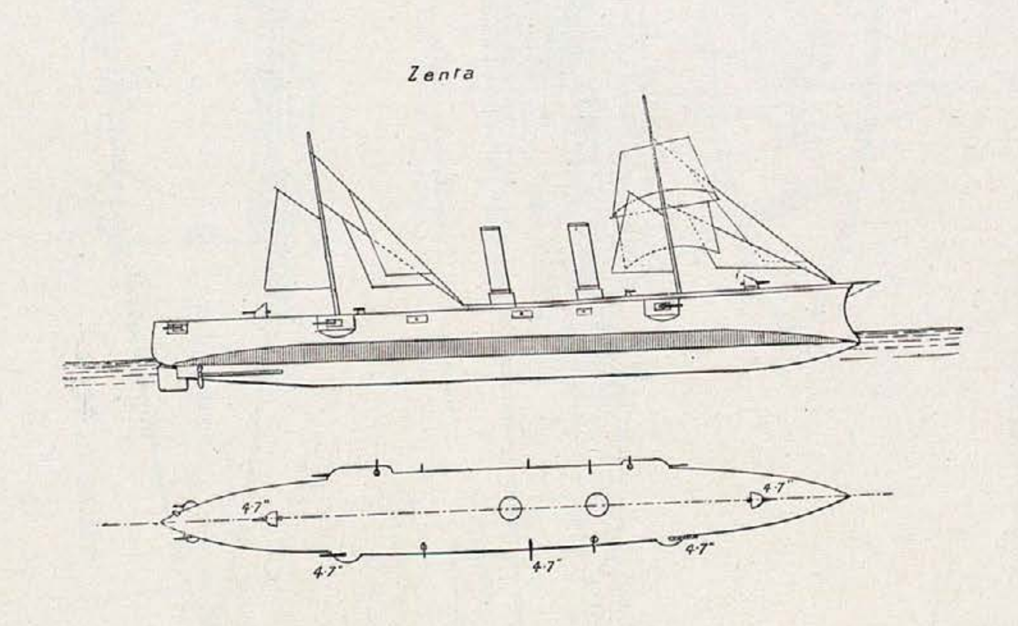
PLATE 19.

AUSTRIA-HUNGARY.

Kreuzer "D"



Zenta



AUSTRIA-HUNGARY.

"Kaiserin Maria Teresa"

L.W.L.

4"

4"

4"

4"

4"

4"

15 c.m. Q.F.

15 c.m. Q.F.

24 c.m.

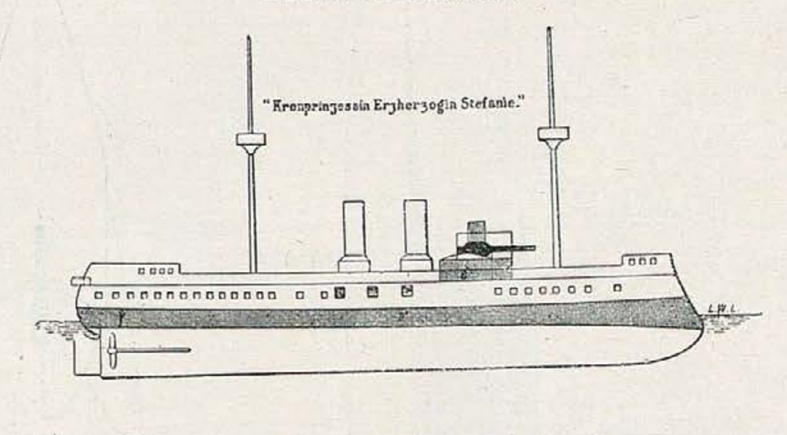
24 c.m.

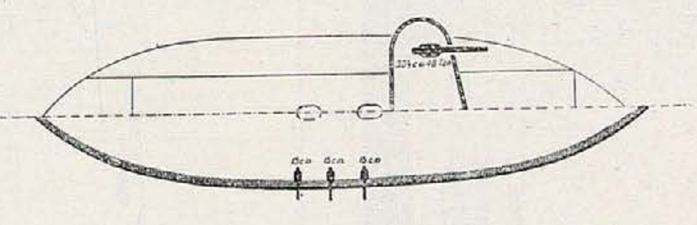
15 c.m. Q.F.

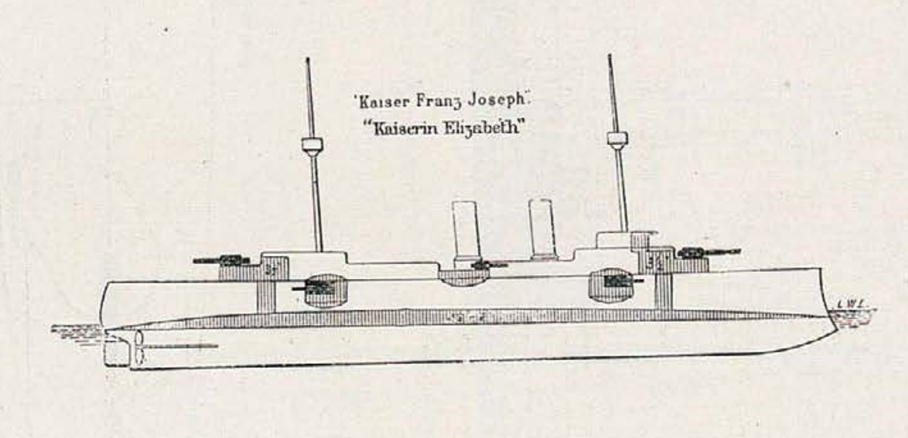
15 c.m. Q.F.

Plate 21.

AUSTRIA-HUNGARY.







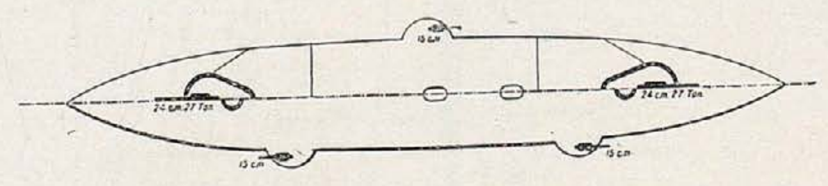


PLATE 22.

AUSTRIA HUNGARY.

"Kronprinz Erzherzog Rudolph"

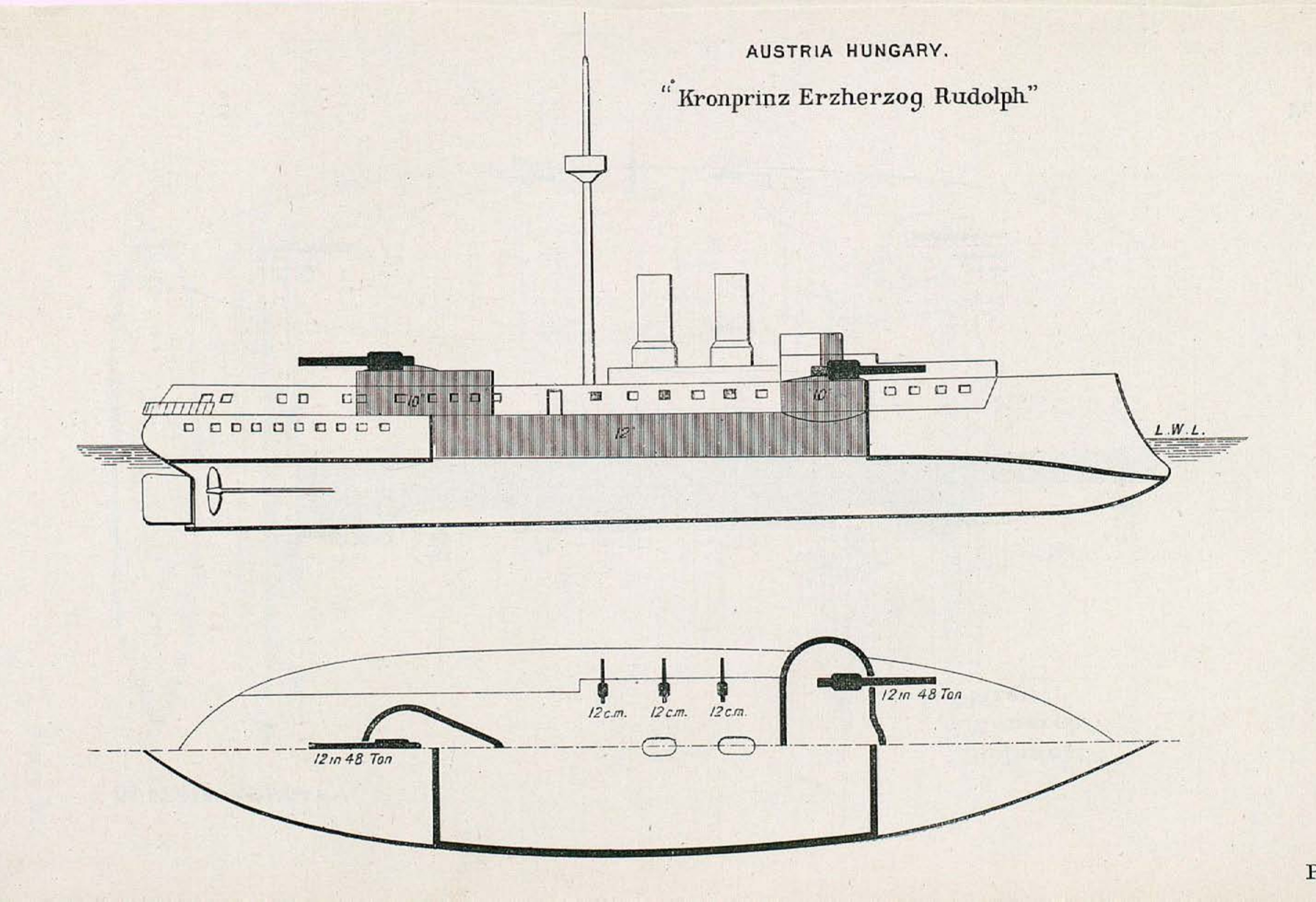
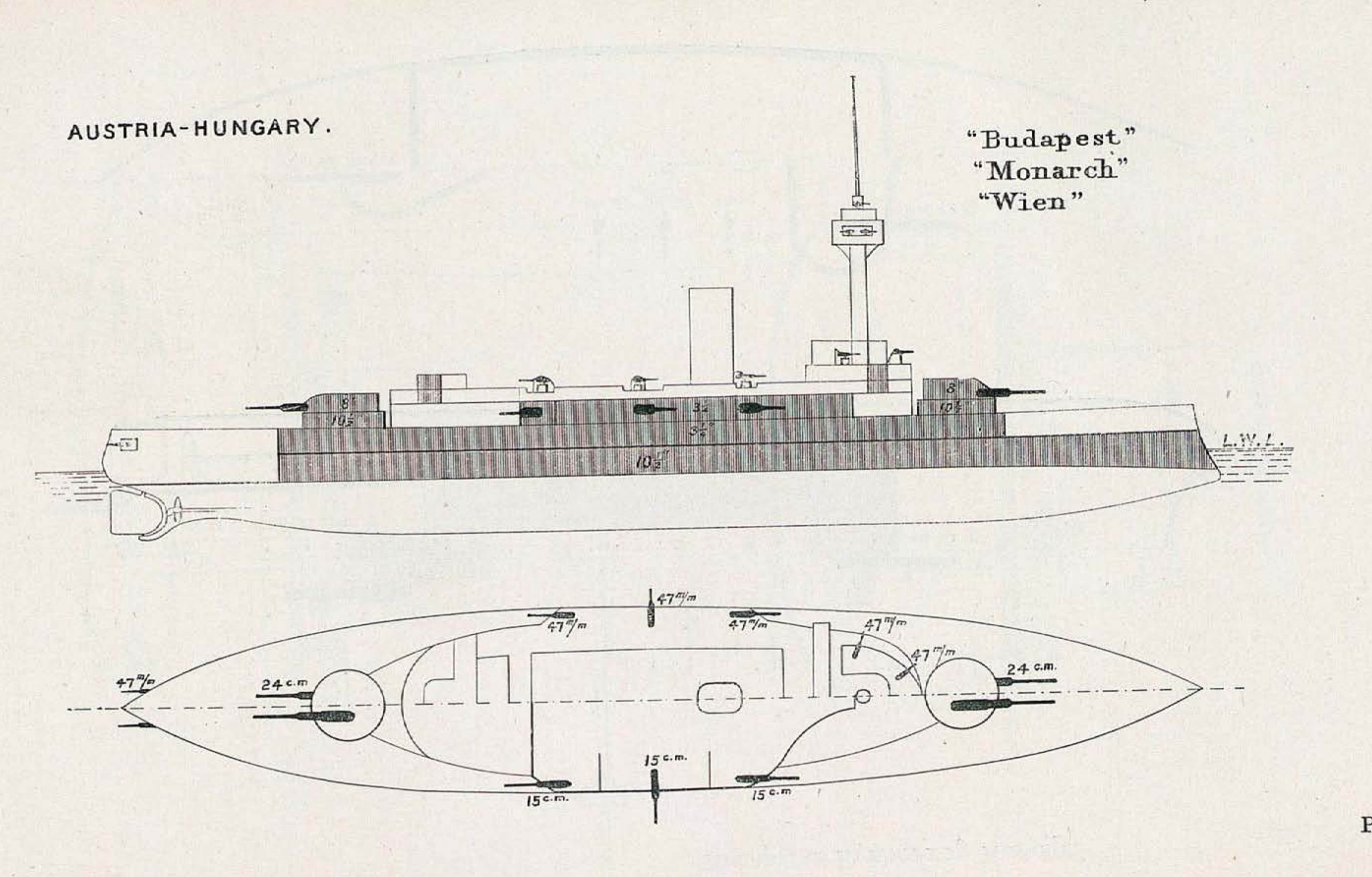


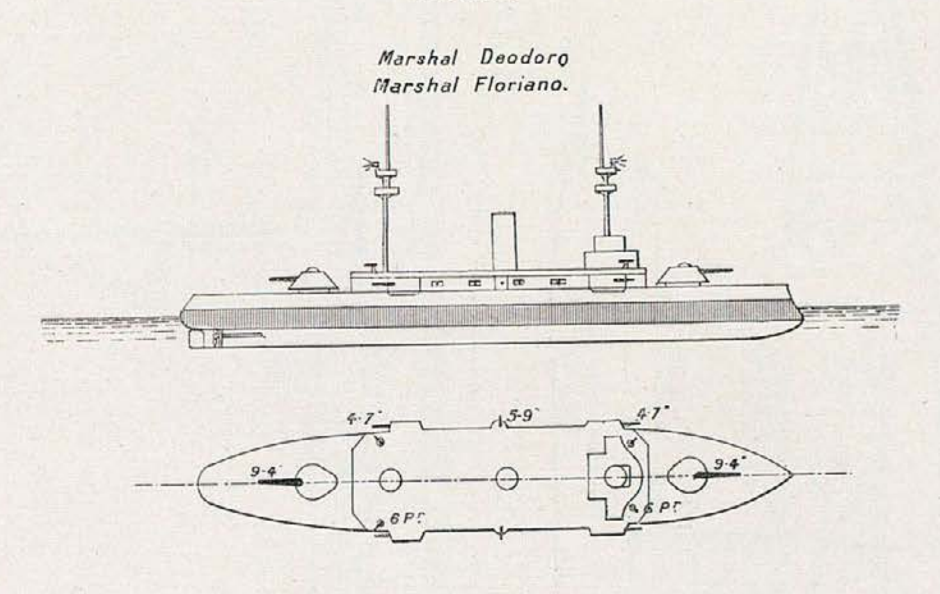
PLATE 23.

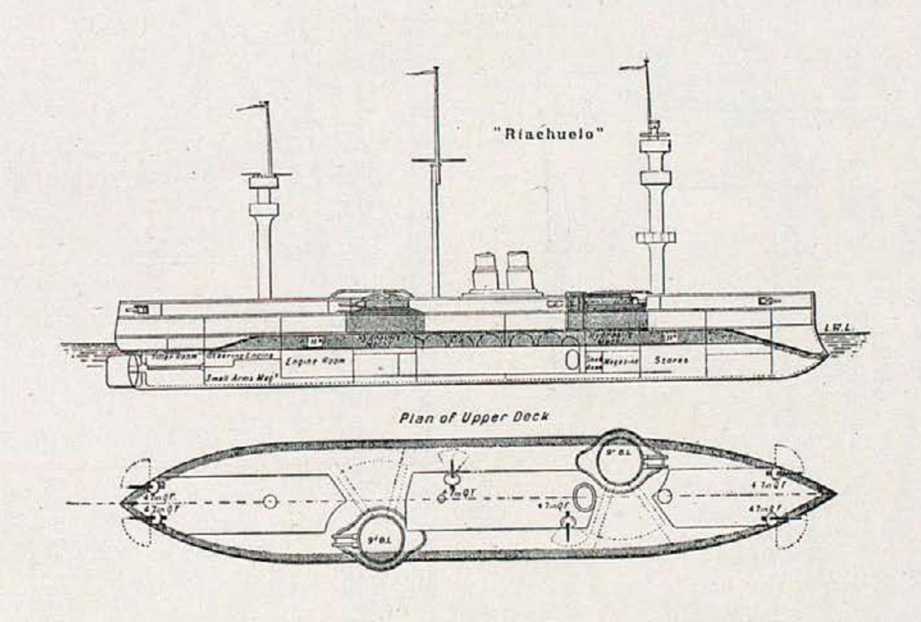
AUSTRIA-HUNGARY.

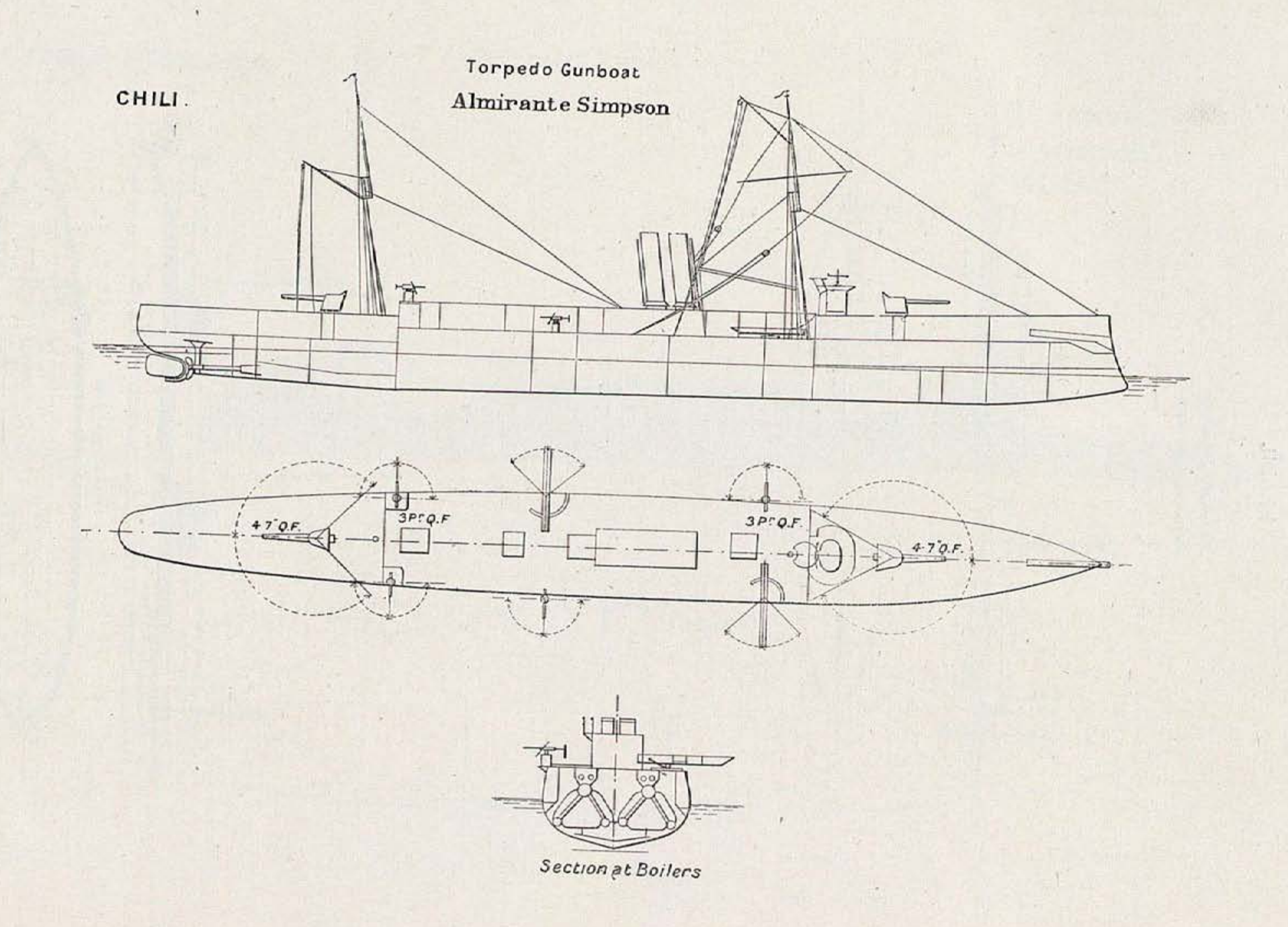
"Budapest"
"Monarch"
"Wien"



BRAZIL


Marshal Deodoro
Marshal Floriano.
4·7"
5·9"
4·7"
9·4"
9·4"
6 P^r
6 P^r


"Riachuelo"
L.W.L.
Engine Room
Small Arms Mag^e
Magazine
Stores
Plan of Upper Deck
9" B.L.
9" B.L.
4·7 in Q.F.
4·7 in Q.F.
4·7 in Q.F.
4·7 in Q.F.
4·7 in Q.F.


CHILI.
Torpedo Gunboat
Almirante Simpson
4·7" Q.F.
3Pr Q.F
3Pr Q.F.
4·7" Q.F.
Section at Boilers

CHILI.

"Blanco Encalada"

L.W.L.

8" B.L
6" Q.F
6" Q.F
6" Q.F
6" Q.F
6" Q.F
8" B.L

PLATE 27

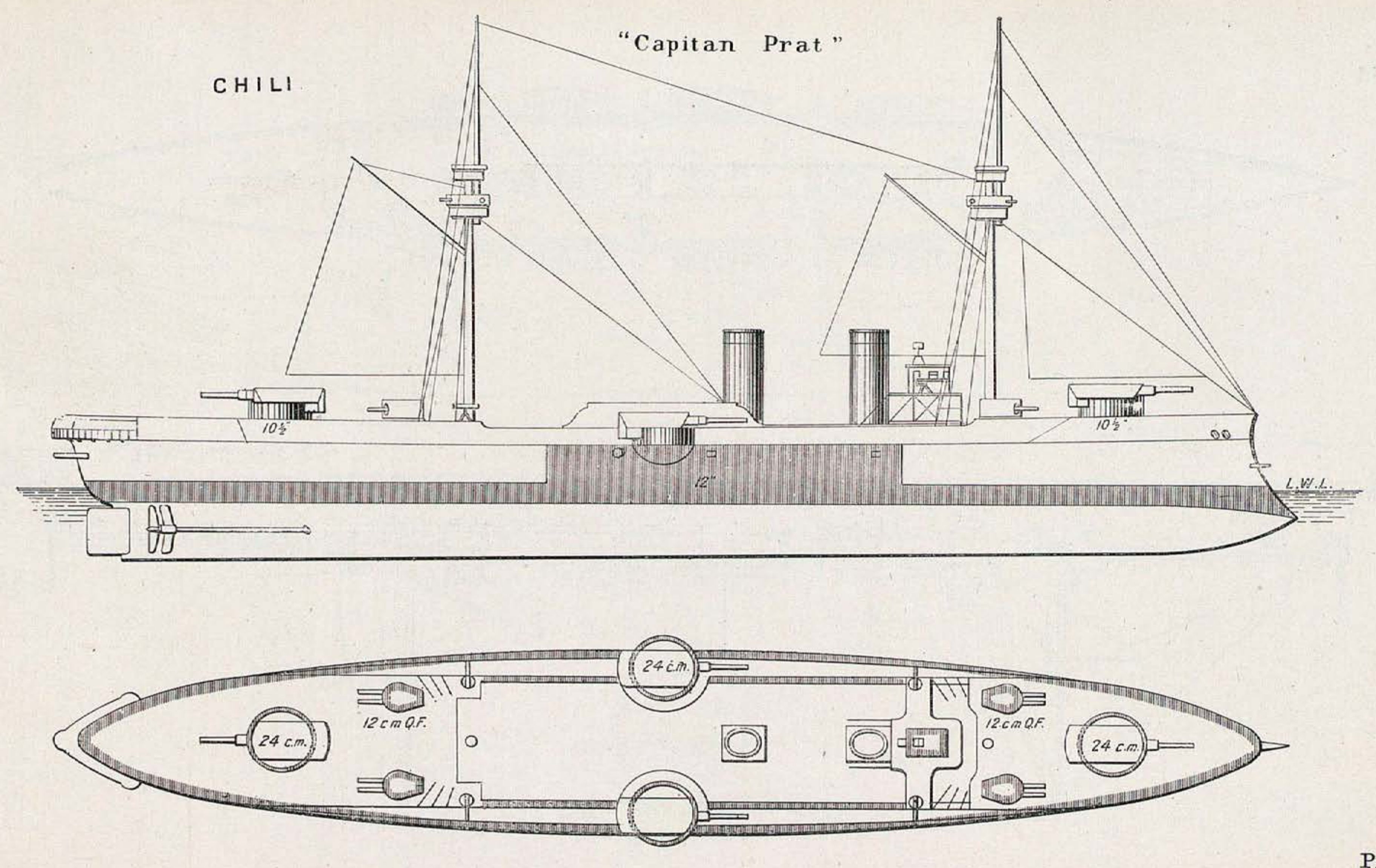
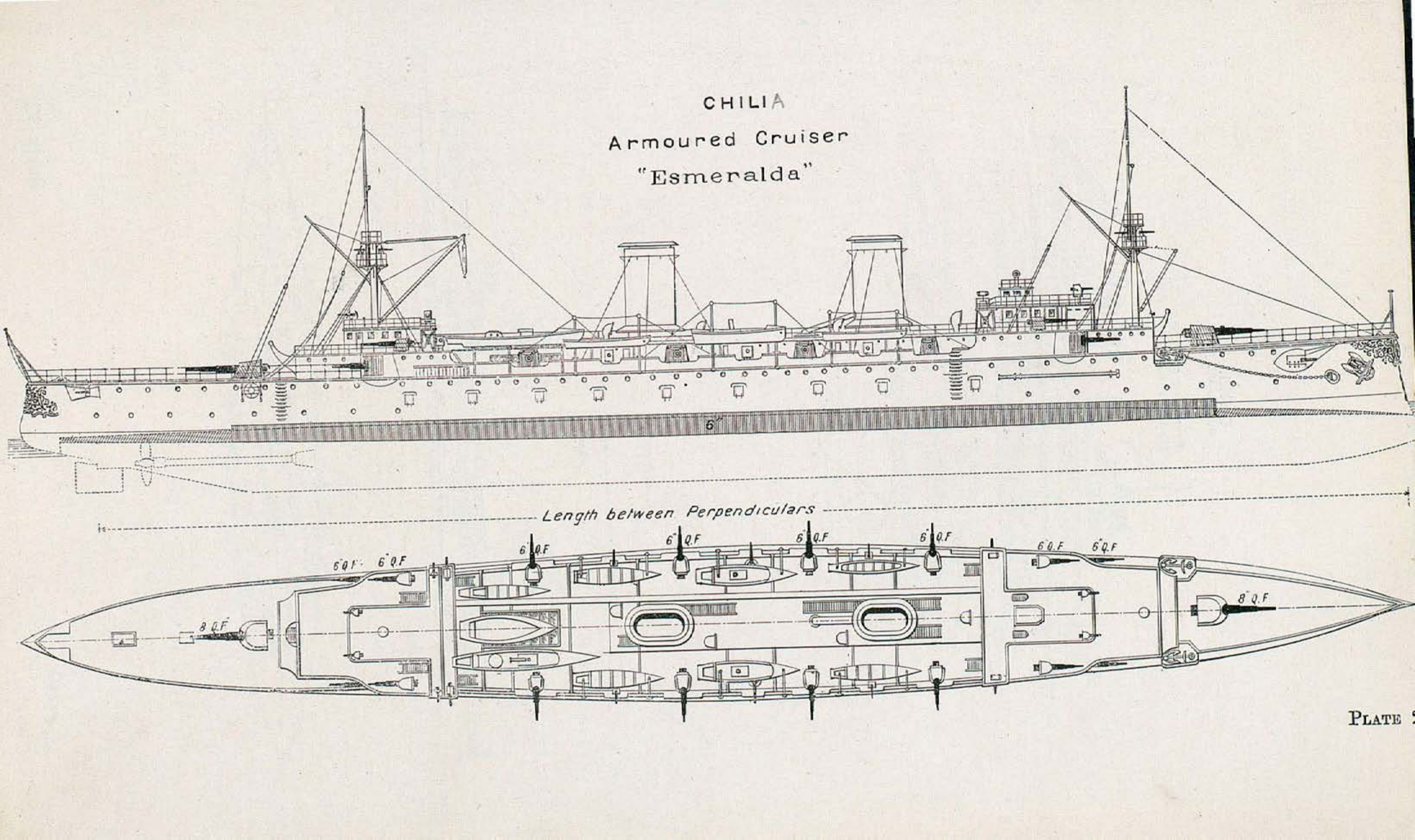
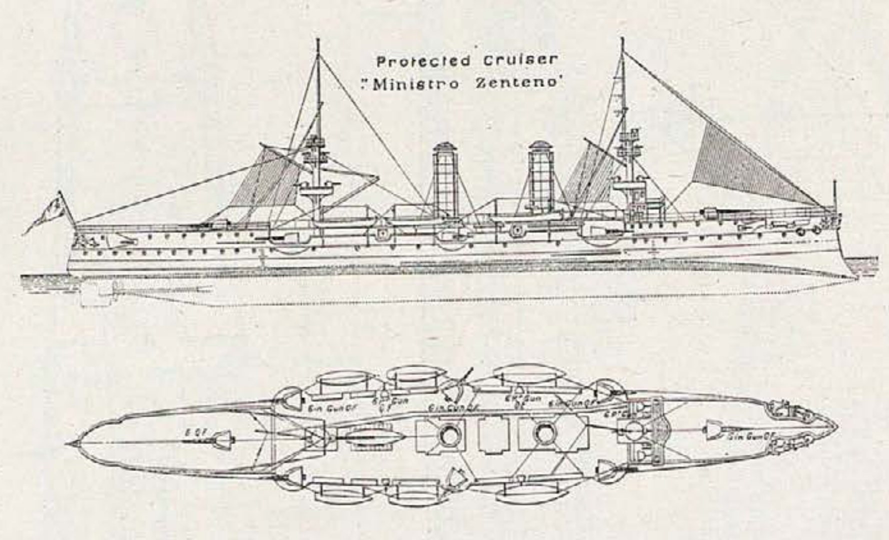

CHILI
"Capitan Prat"
10½"
12"
10½"
L.W.L.
24 c.m.
12 c m Q.F.
24 c.m.
12 c m Q.F.
24 c.m.

PLATE 28.

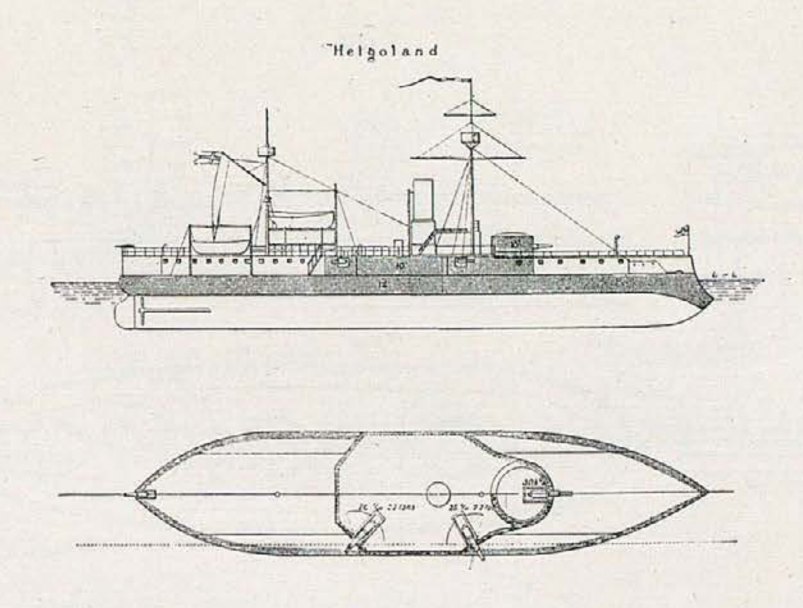

CHILIA
Armoured Cruiser
"Esmeralda"
6"
Length between Perpendiculars
6" Q.F
6" Q.F
6" Q.F
6" Q.F
6" Q.F
6" Q.F
6" Q.F
6" Q.F
8" Q.F
8" Q.F
PLATE 2

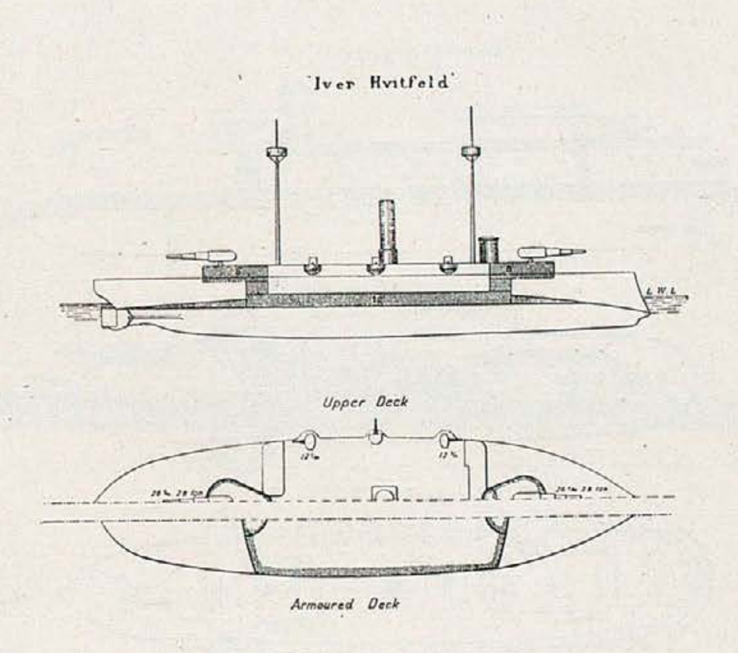
CHILI.



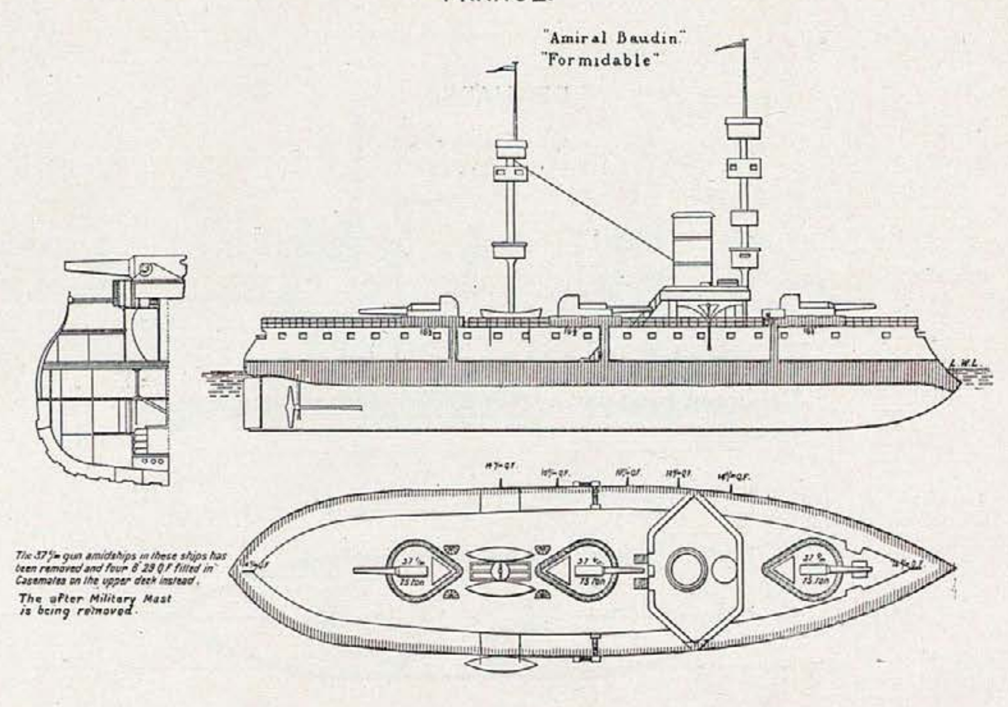
O' Higgins

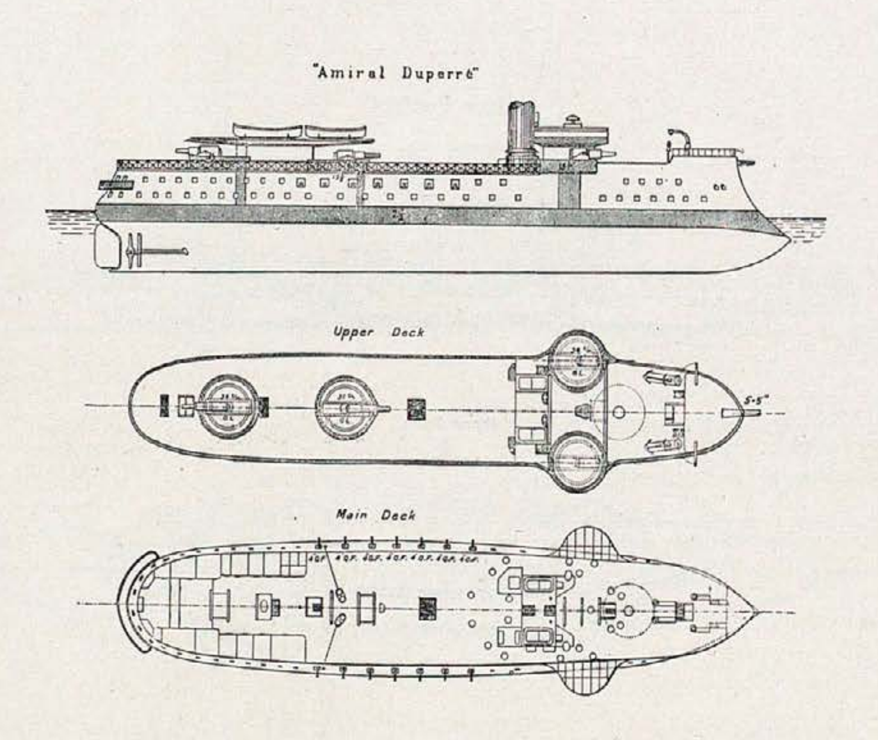
DENMARK.

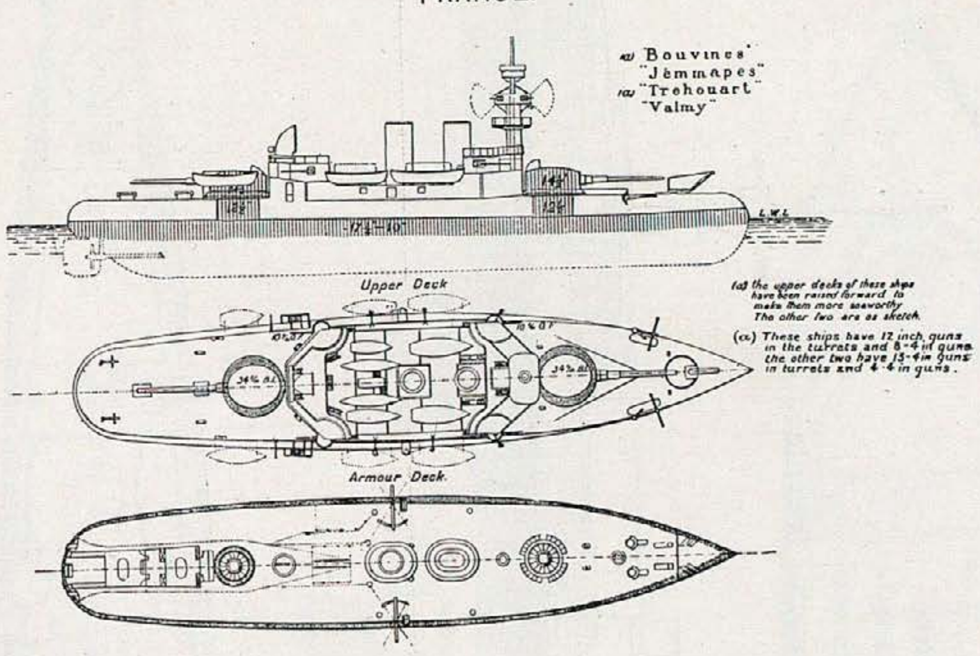


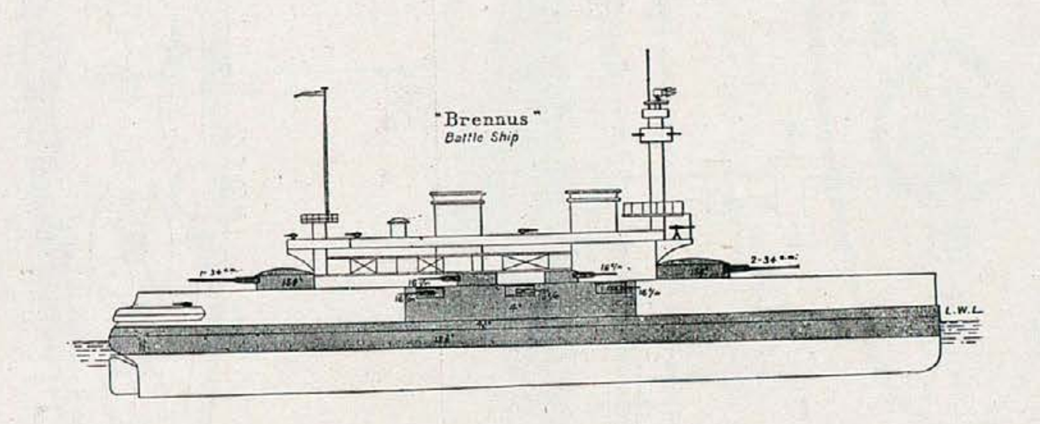


FRANCE.


"Amiral Baudin"
"Formidable"
L.W.L.
The 37 c/m gun amidships in these ships has been removed and four 6" 23 Q.F fitted in Casemates on the upper deck instead.
The after Military Mast is being removed.

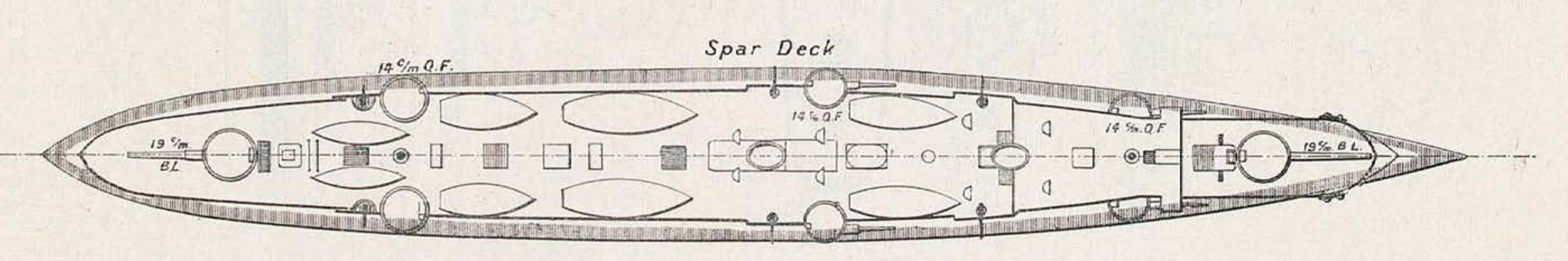

"Amiral Duperré"
Upper Deck
Main Deck


(a) "Bouvines"
"Jèmmapes"
(a) "Trehouart"
"Valmy"
L.W.L.
Upper Deck
Armour Deck
(a) the upper decks of these ships have been raised forward to make them more seaworthy The other two are as sketch.
(α) These ships have 12 inch guns in the turrets and 8-4 in guns the other two have 13-4 in guns in turrets and 4-4 in guns.


"Brennus"
Battle Ship
L.W.L.

FRANCE.

"Bruix" *class* { "Bruix" / "Chanzy" / "Charner" / "Latouche Tréville"



"Caiman"
"Indomptable"
"Requin"
"Terrible"

L.W.L.

Note. These ships are in hand for refit. The 42 c/m guns are to be replaced by two 35 c/m guns.

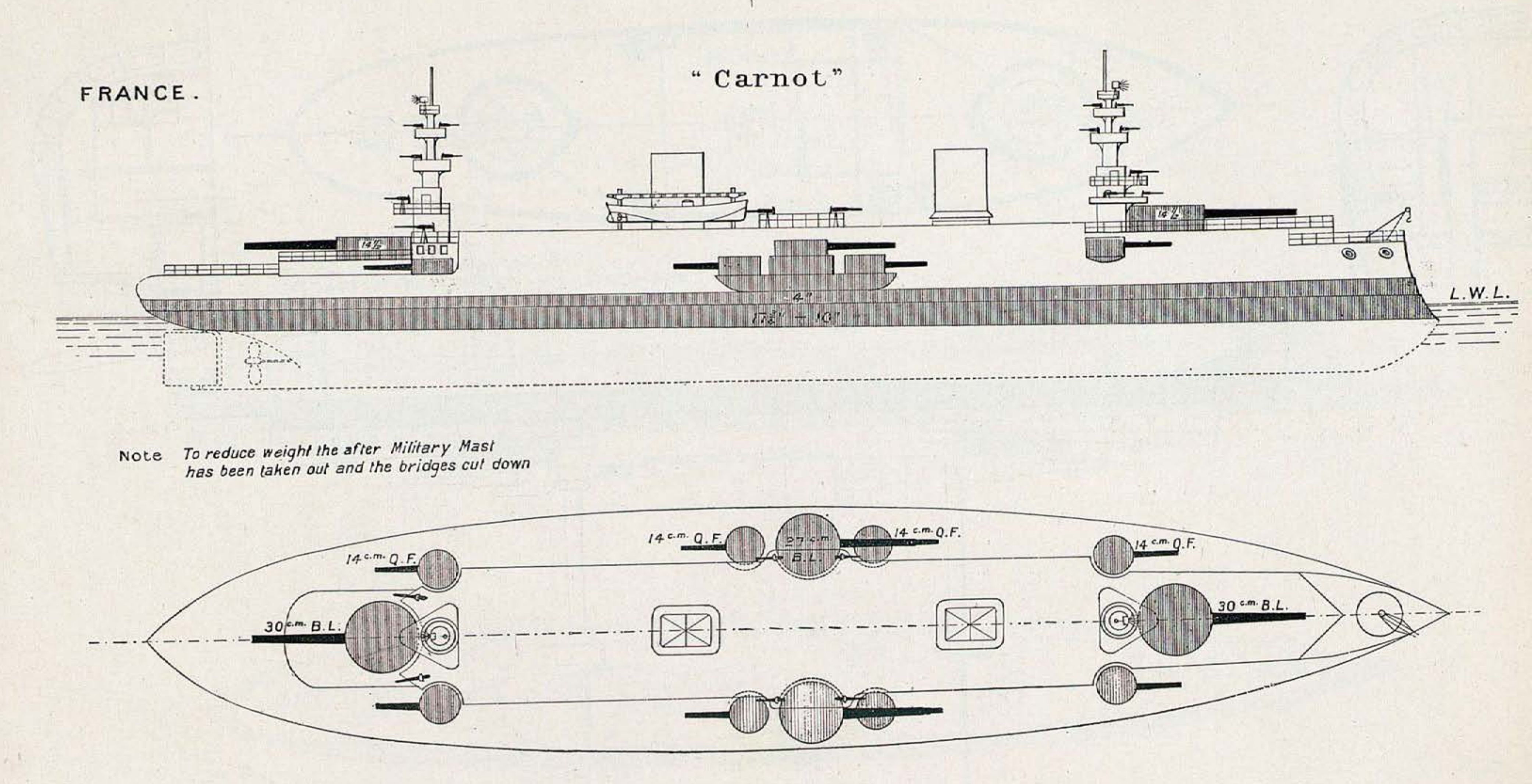
10 c/m Q.F.

10 c/m Q.F.

17 c/m

42 c/m B.L.

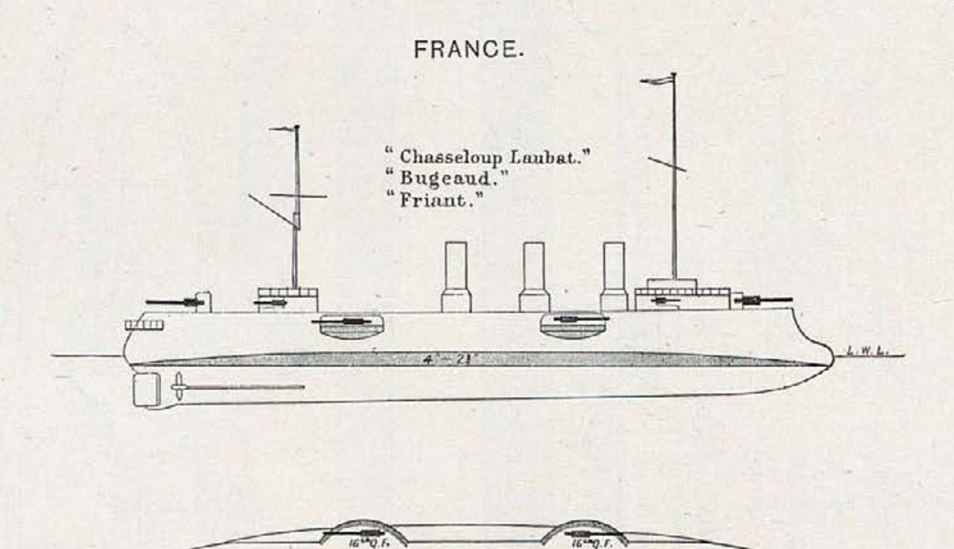
42 c/m B.L.

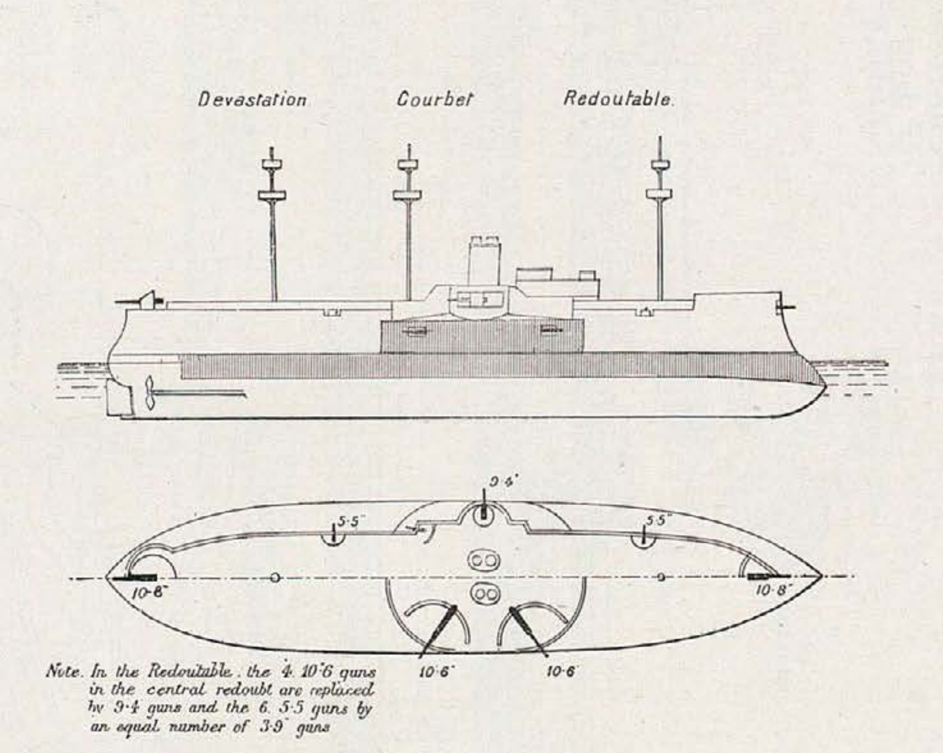

FRANCE.
"Carnot"
14½
4"
L.W.L.
Note To reduce weight the after Military Mast has been taken out and the bridges cut down
14 c.m. Q.F.
27 c.m. B.L.
14 c.m. Q.F.
14 c.m. Q.F.
14 c.m. Q.F.
30 c.m. B.L.
30 c.m. B.L.

FRANCE

"Charlemagne"
"St Louis"
"Gaulois"

FRANCE.

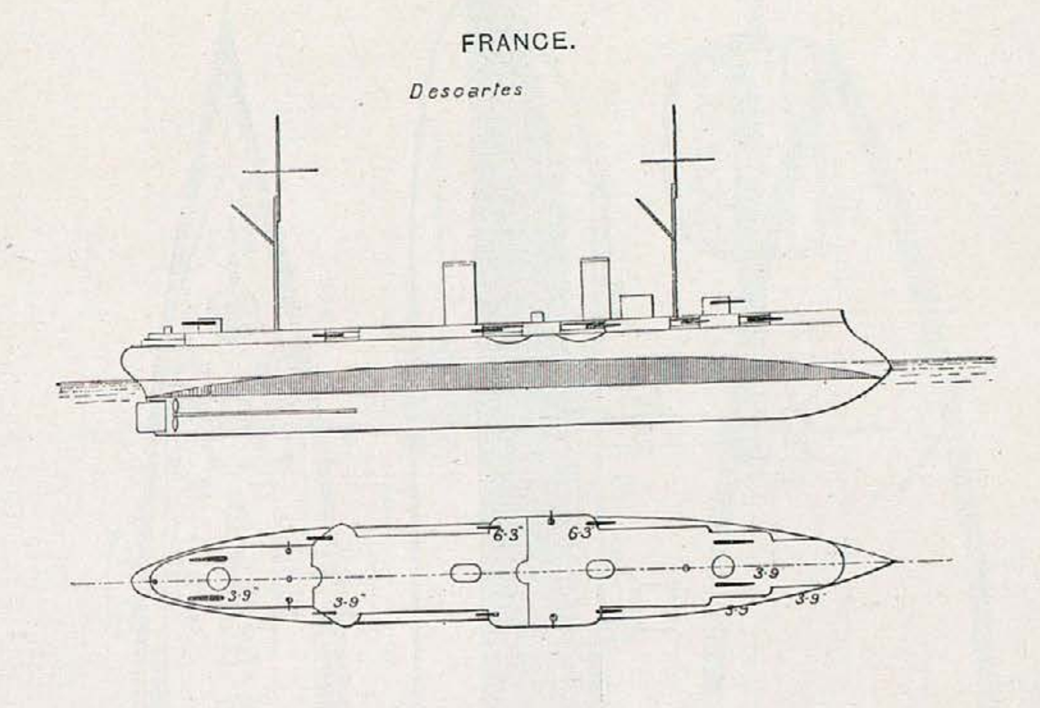




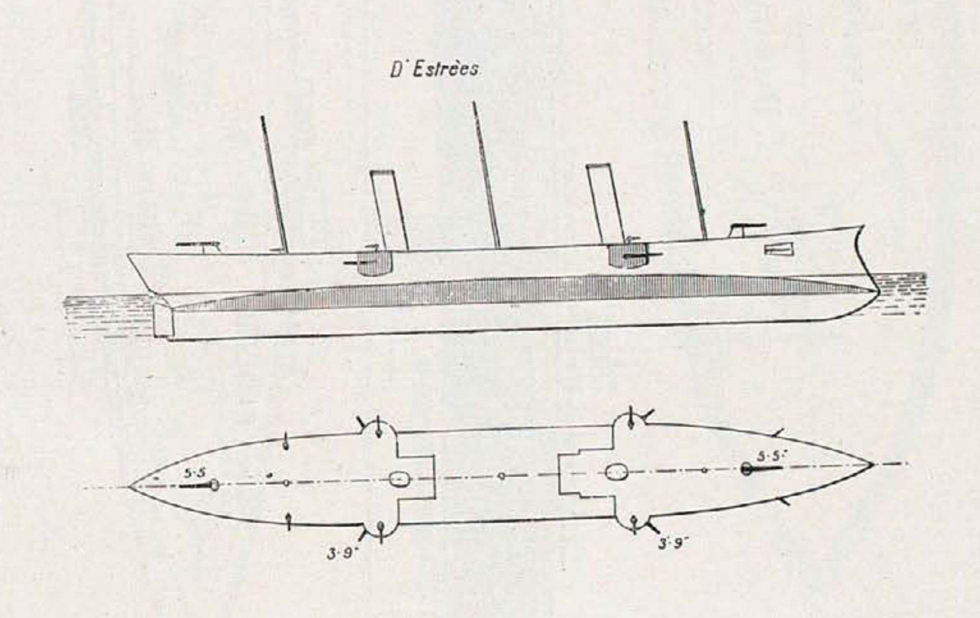
Note. In the Redoutable, the 4 10·6 guns in the central redoubt are replaced by 9·4 guns and the 6 5·5 guns by an equal number of 3·9" guns

FRANCE.

Descartes



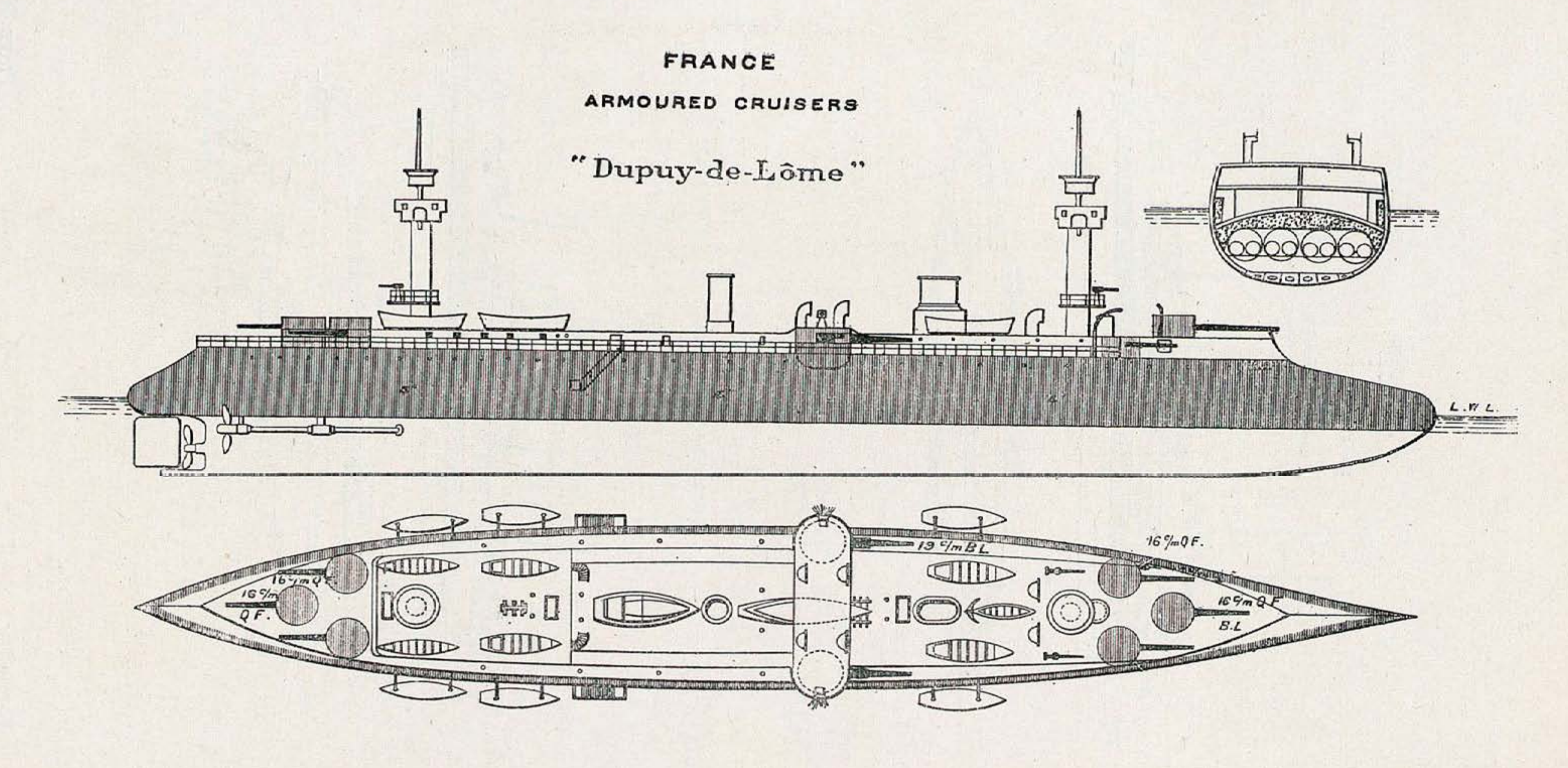
D'Estrées



FRANCE

ARMOURED CRUISERS

"Dupuy-de-Lôme"



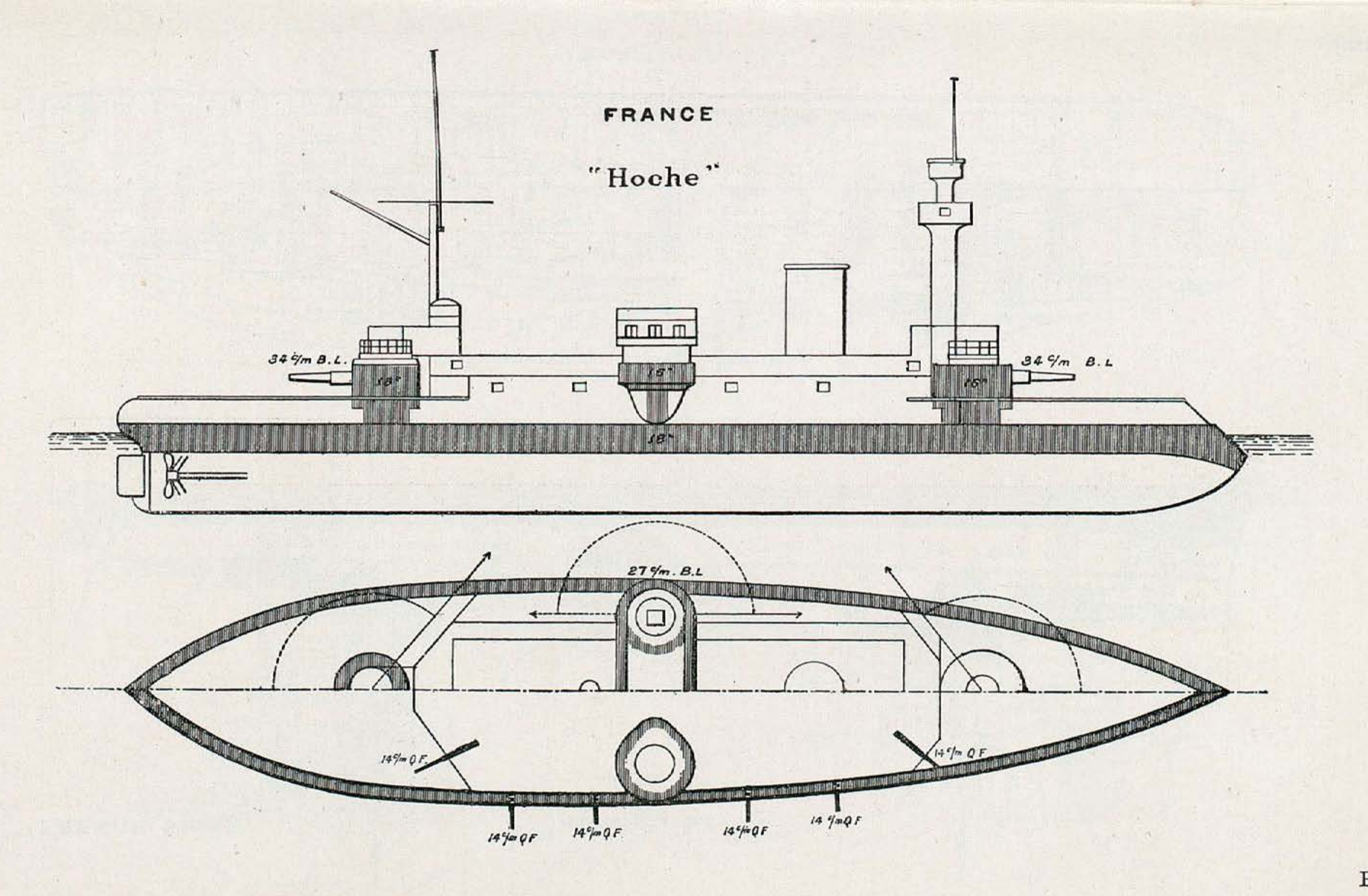
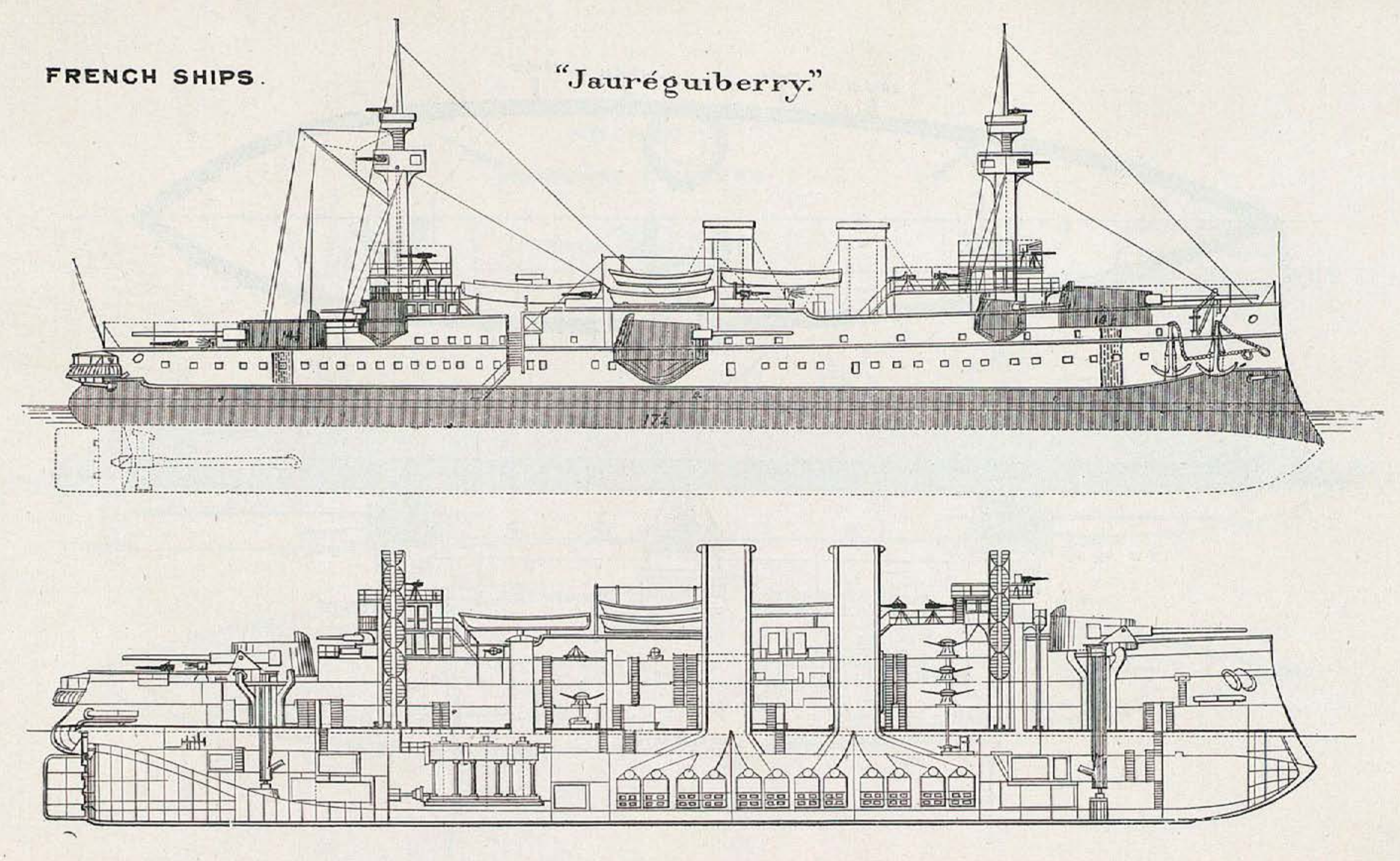

FRANCE
"Hoche"
34 c/m B.L.
34 c/m B.L
15"
15"
15"
18"
27 c/m. B.L
14 c/m Q.F.
14 c/m Q.F
14 c/m Q.F
14 c/m Q.F.
14 c/m Q.F
14 c/m Q.F

Plate 41.

"Jauréguiberry."



FRANCE

"Jauréguiberry."

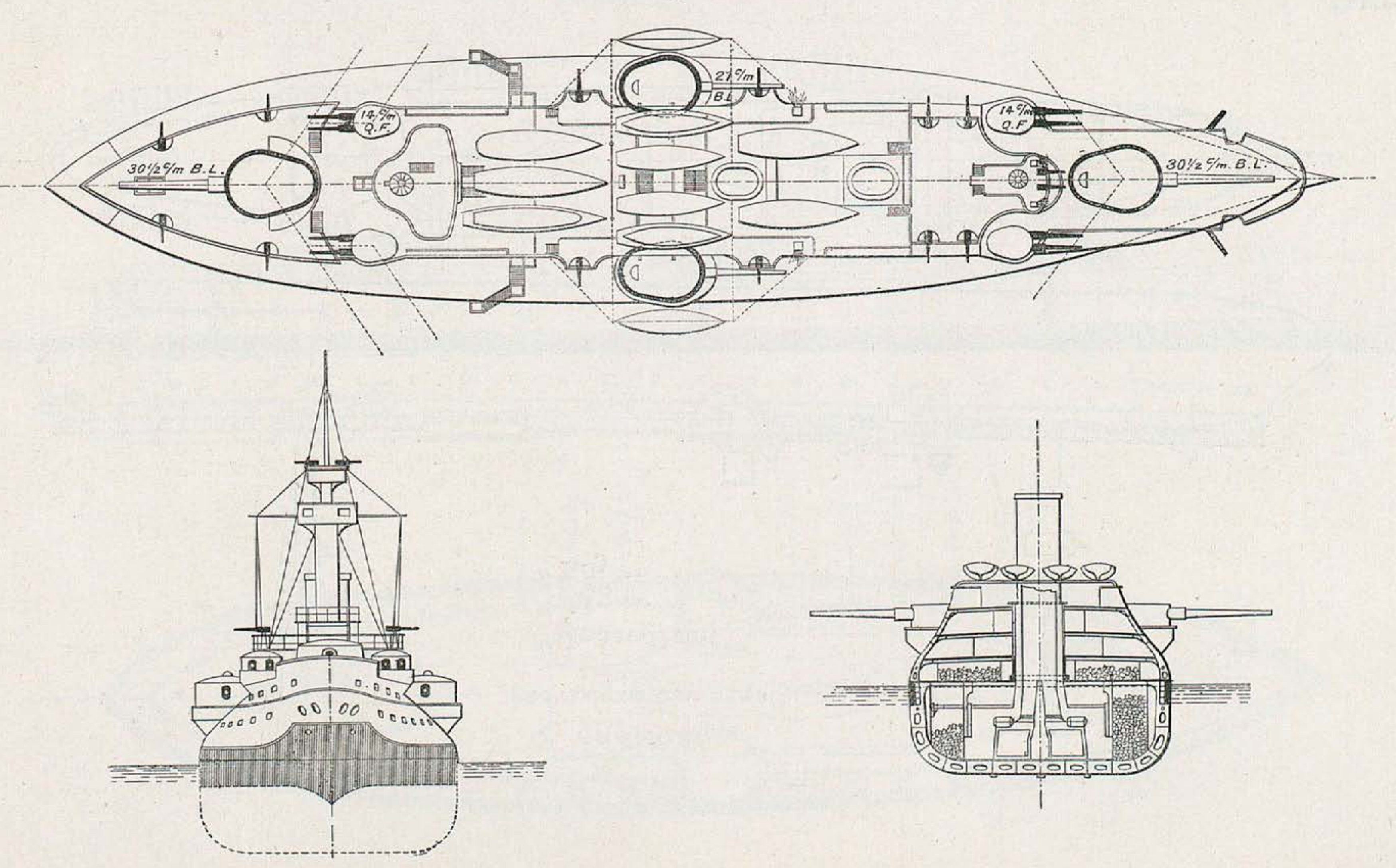


Plate 43.

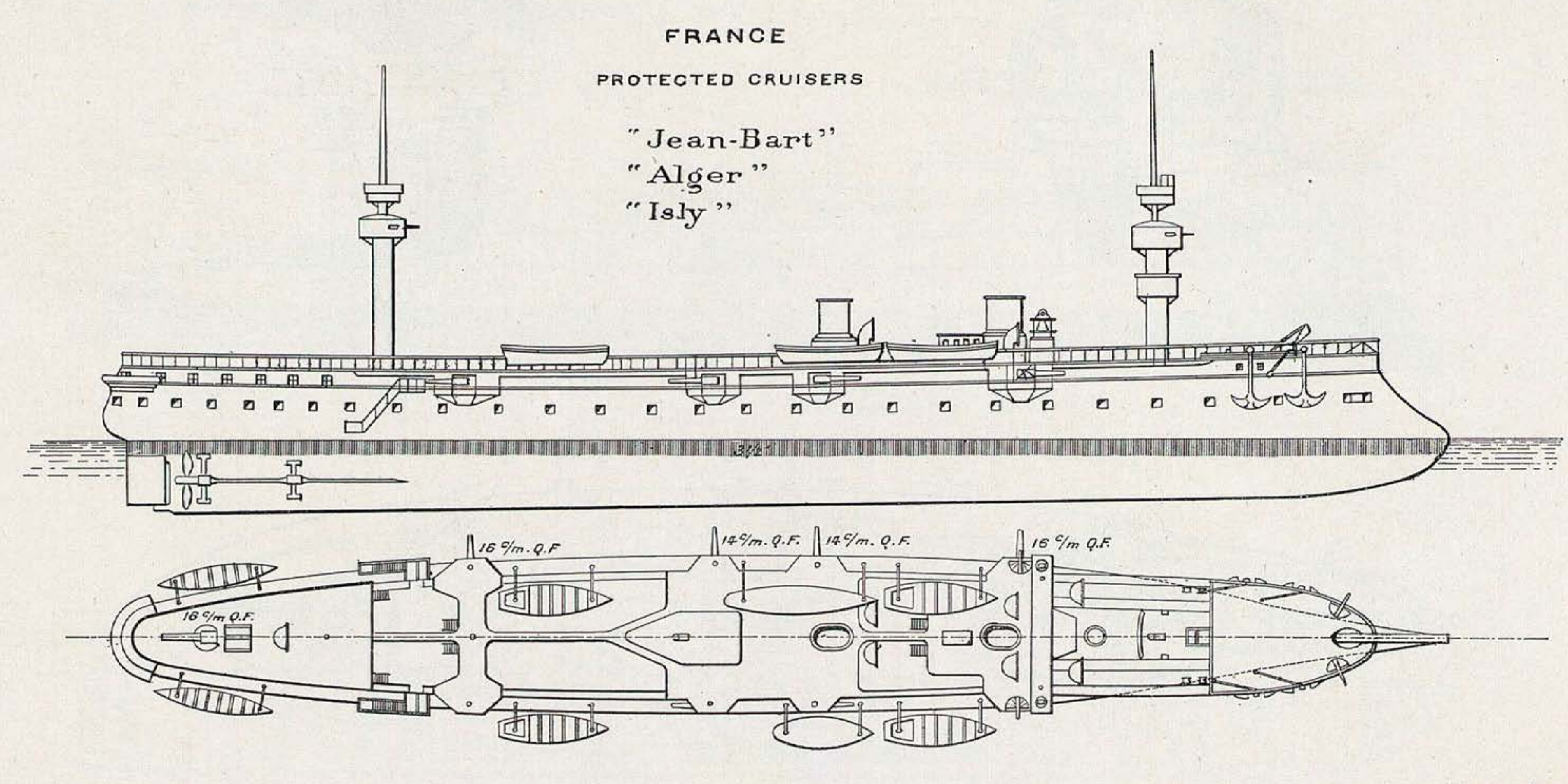

FRANCE
PROTECTED CRUISERS
"Jean-Bart"
"Alger"
"Isly"
16 c/m Q.F.
14 c/m. Q.F.
14 c/m. Q.F.
16 c/m Q.F.
16 c/m Q.F.

PLATE 44.

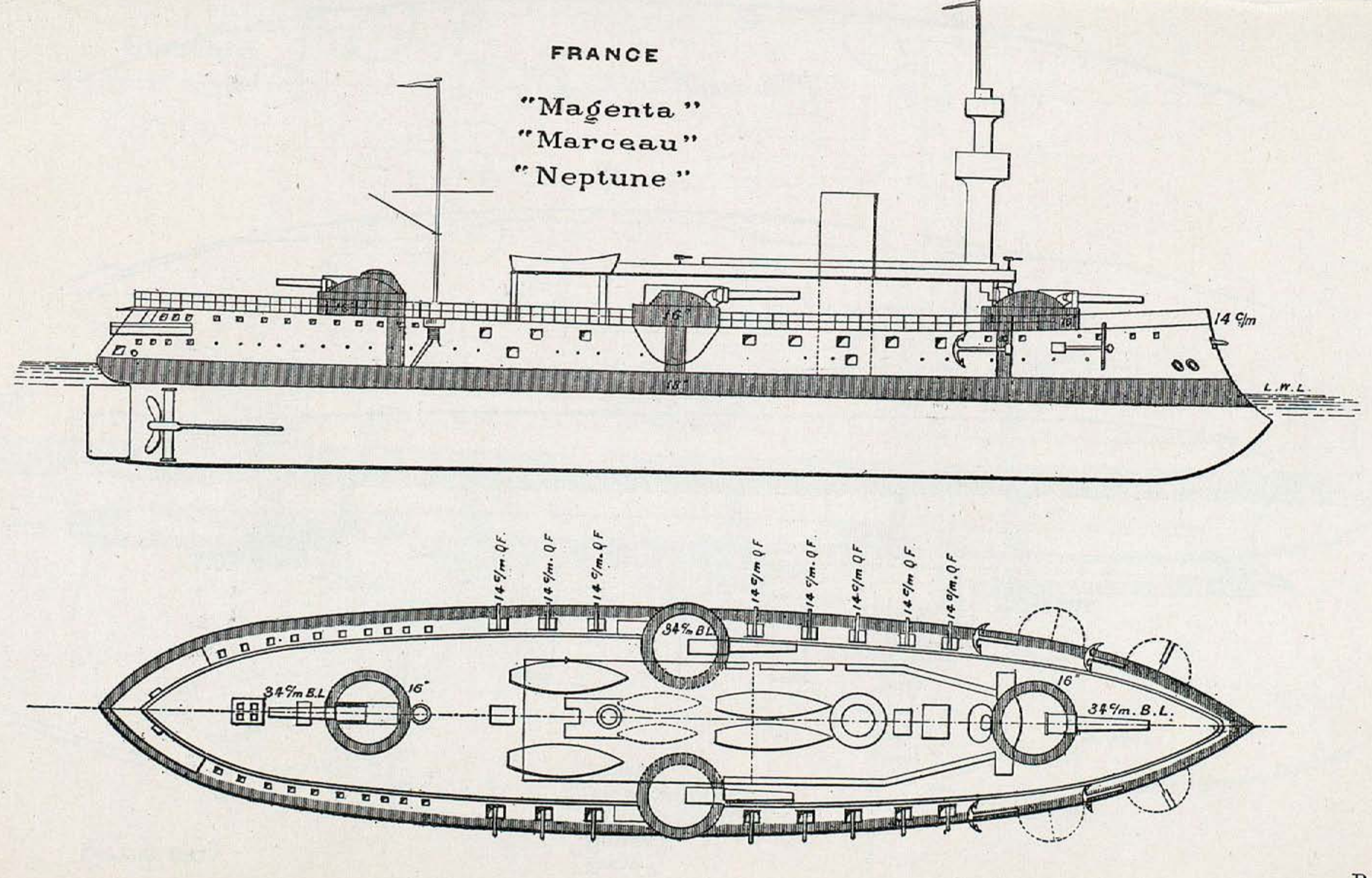
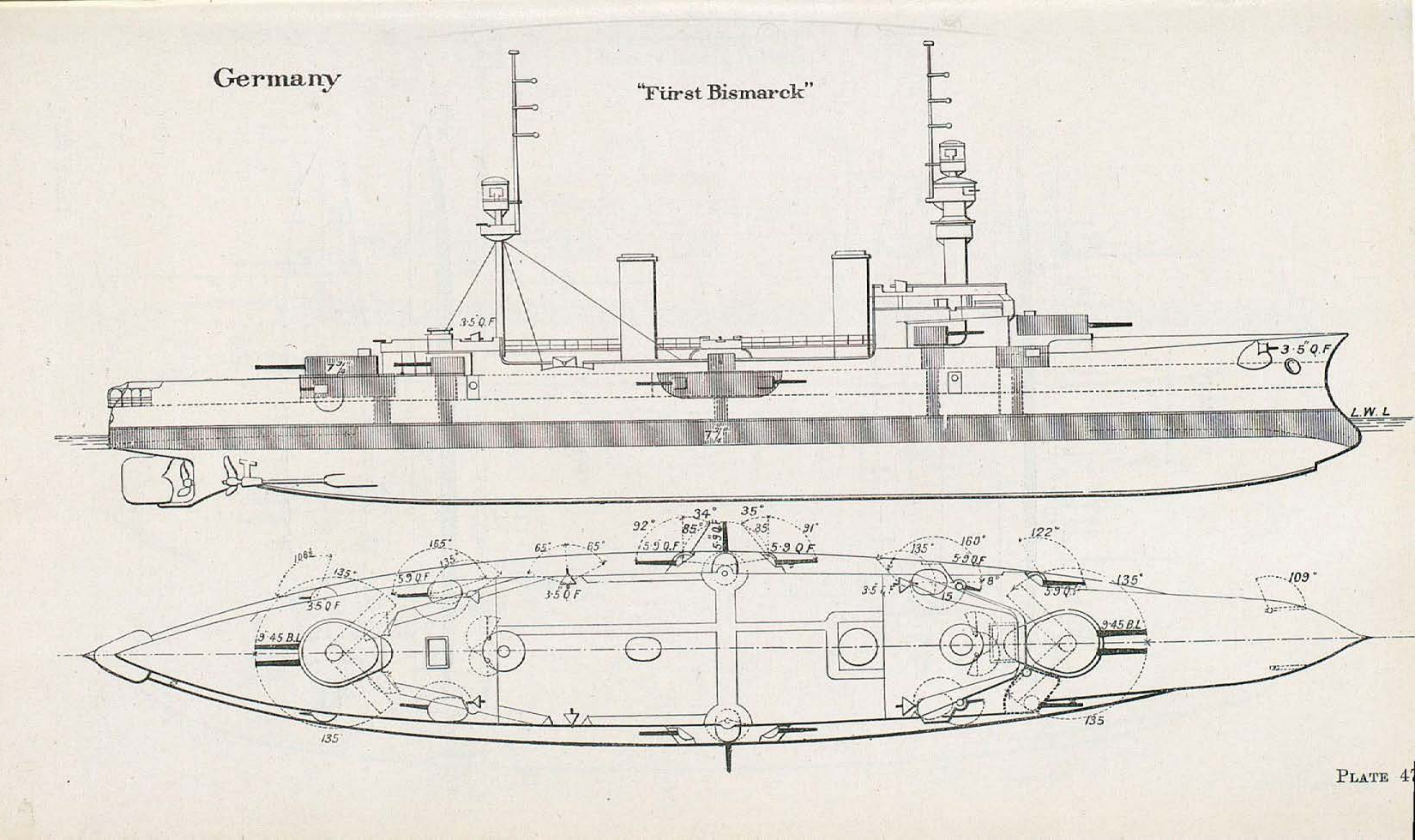

FRANCE
"Magenta"
"Marceau"
"Neptune"
14 c/m
L.W.L.
16"
18"
14 c/m.Q.F
34 c/m B.L.
34 c/m.B.L.

Plate 45.

Germany.

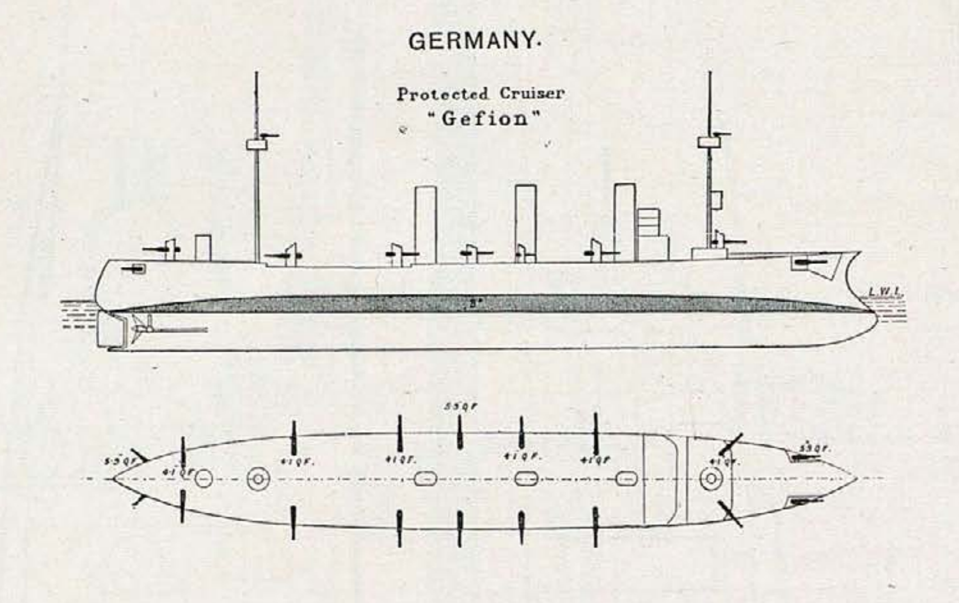
"Freya"
"Hansa"
"Hertha"
"Victoria Louise"
"Vineta"

"Fürst Bismarck"

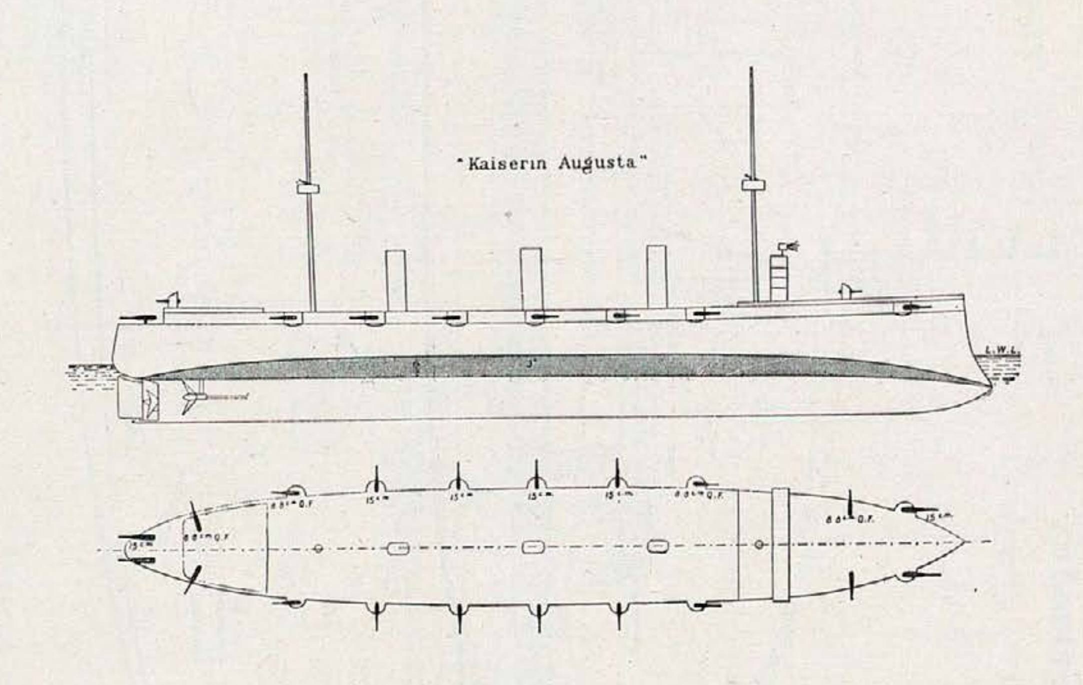


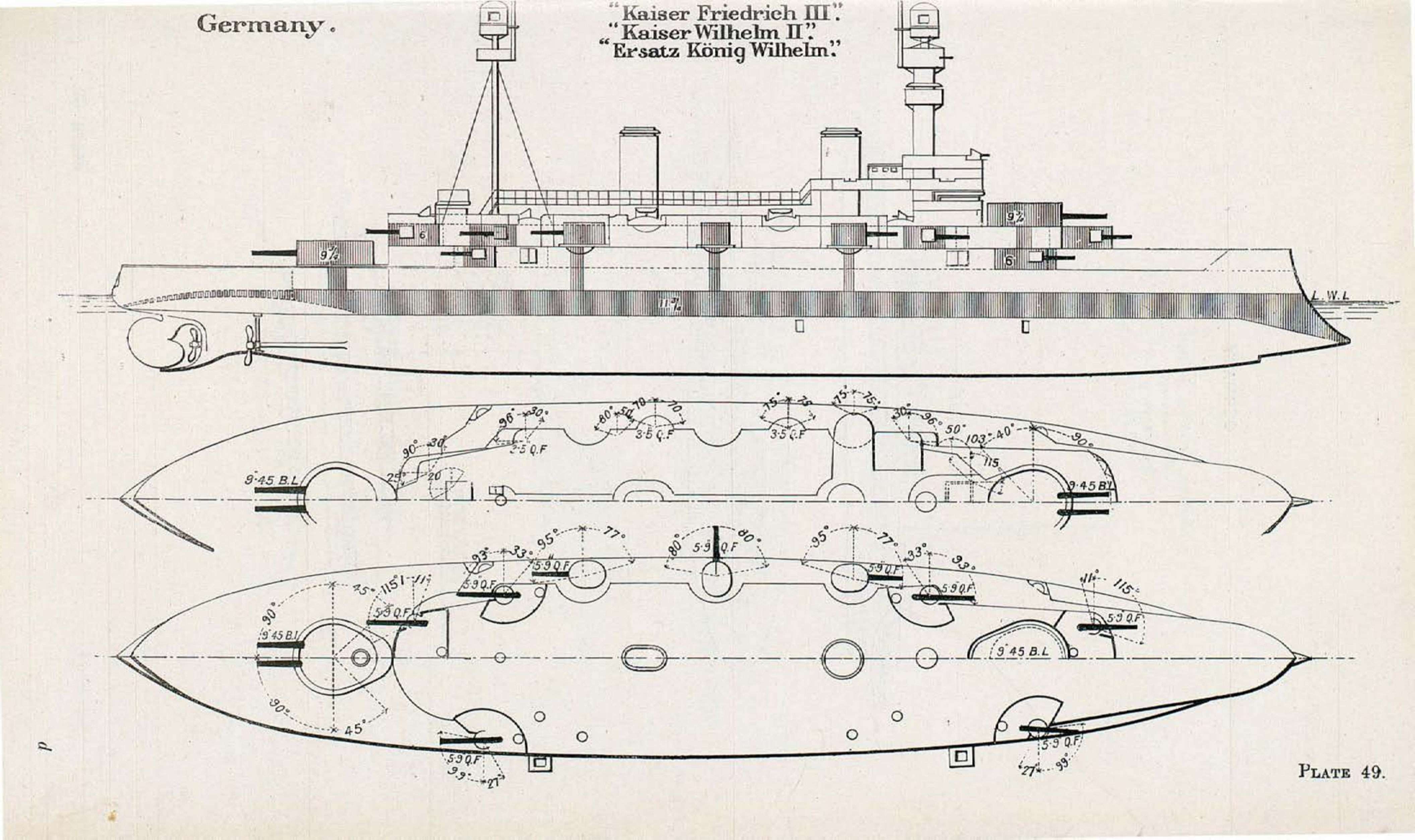
GERMANY.

Protected Cruiser
"Gefion"



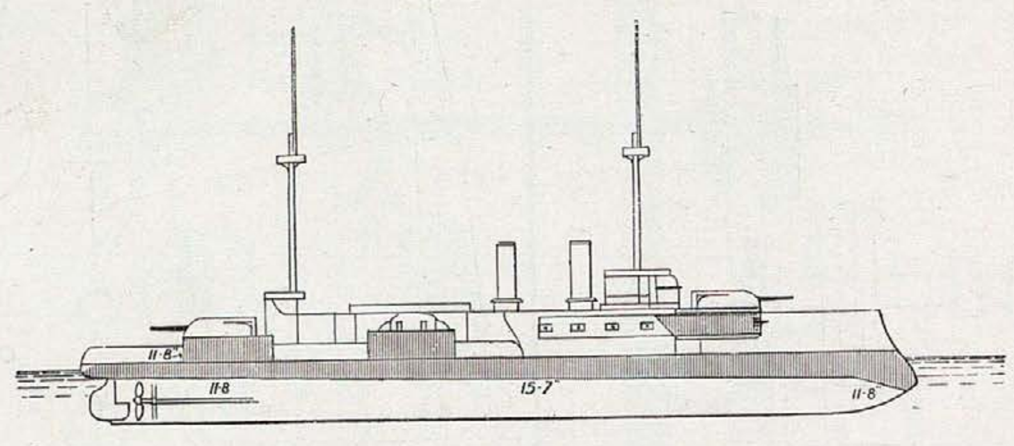
"Kaiserin Augusta"

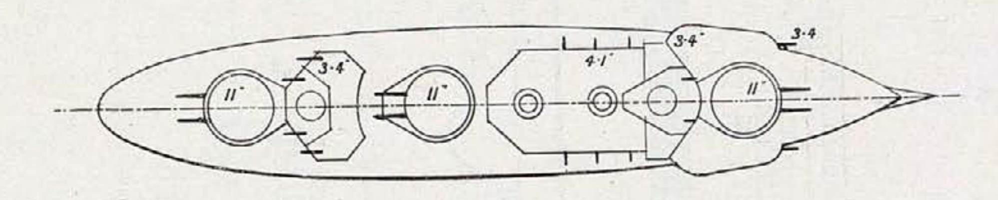


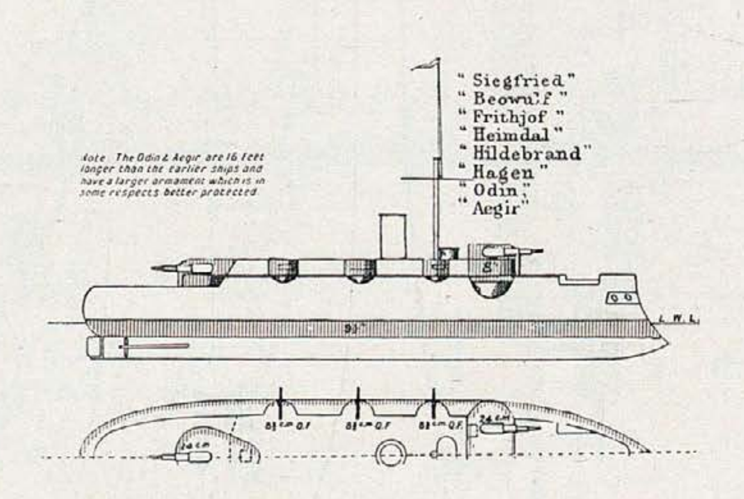

Germany.
"Kaiser Friedrich III".
"Kaiser Wilhelm II".
"Ersatz König Wilhelm."
9¼
6
11¾
L.W.L
9·45 B.L
3·5 Q.F
5·9 Q.F
Plate 49.

GERMANY

Kürfurst Friedrich Wilhelm.
Brandenburg.
Weissenburg.
Wörth.



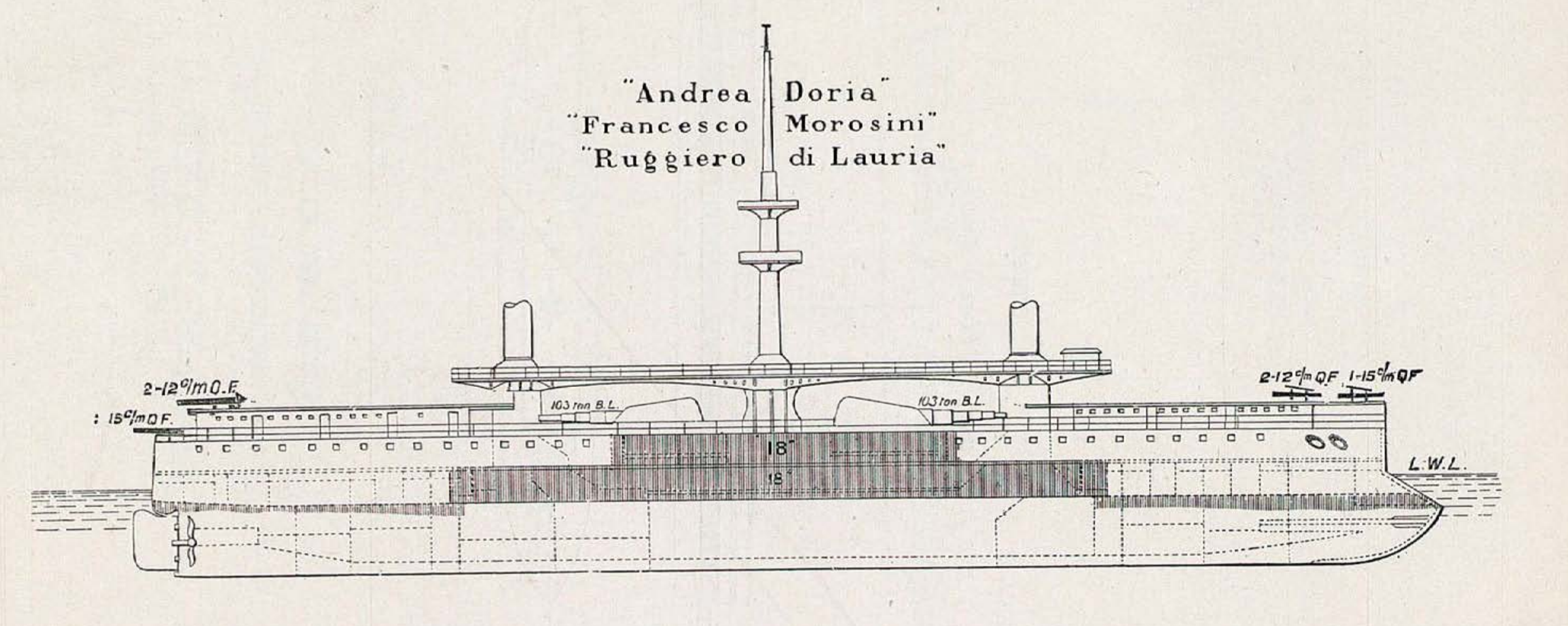




GREECE

Hydra. *Psara.* *Spetsai.*

ITALY.

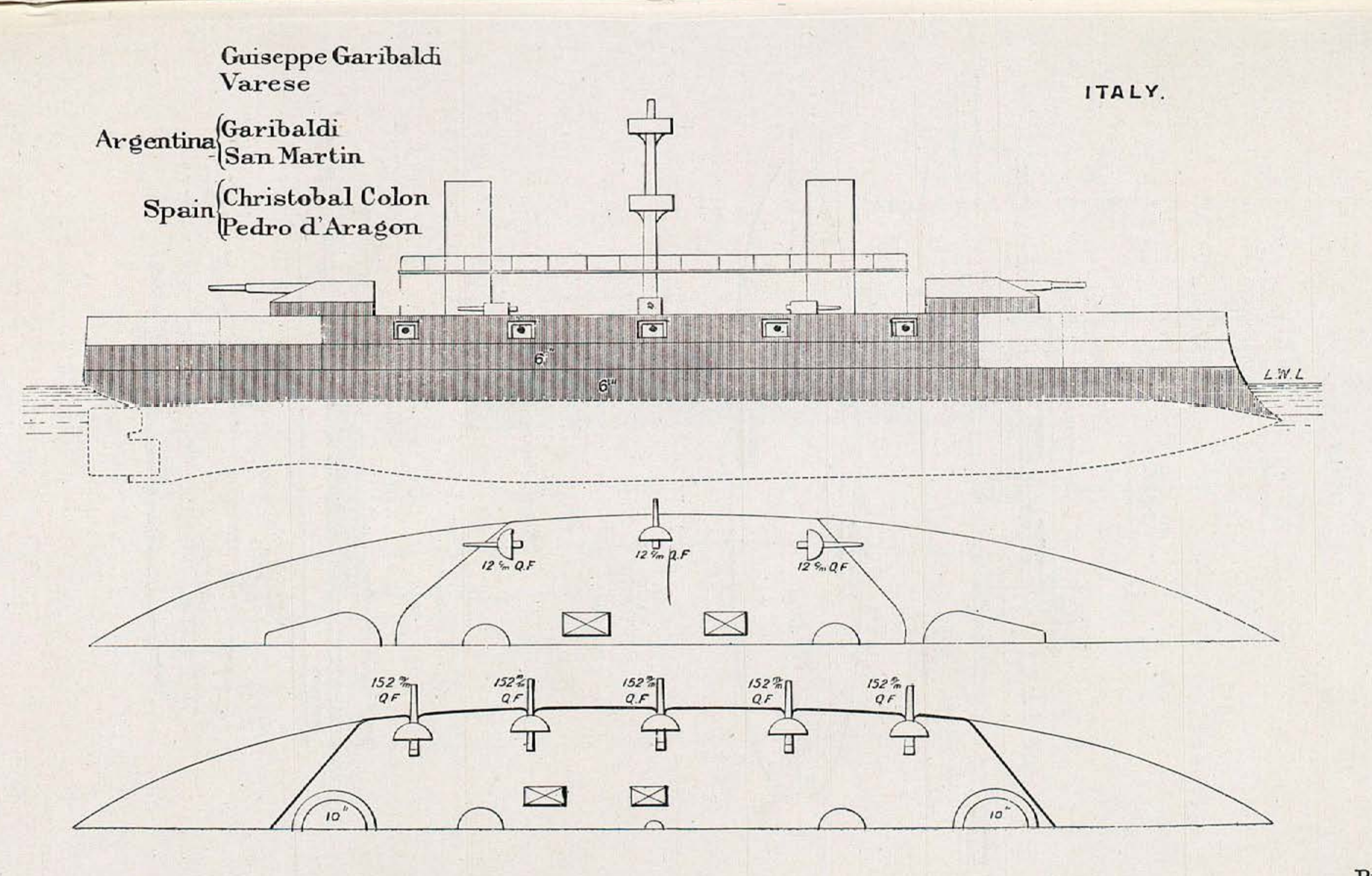


"Andrea Doria"
"Francesco Morosini"
"Ruggiero di Lauria"
2-12c/m Q.F.
: 15c/m Q.F.
103 ton B.L.
103 ton B.L.
18"
18"
2-12c/m Q.F.
1-15c/m Q.F.
L.W.L.

Guiseppe Garibaldi
Varese

Argentina {Garibaldi, San Martin}

Spain {Christobal Colon, Pedro d'Aragon}

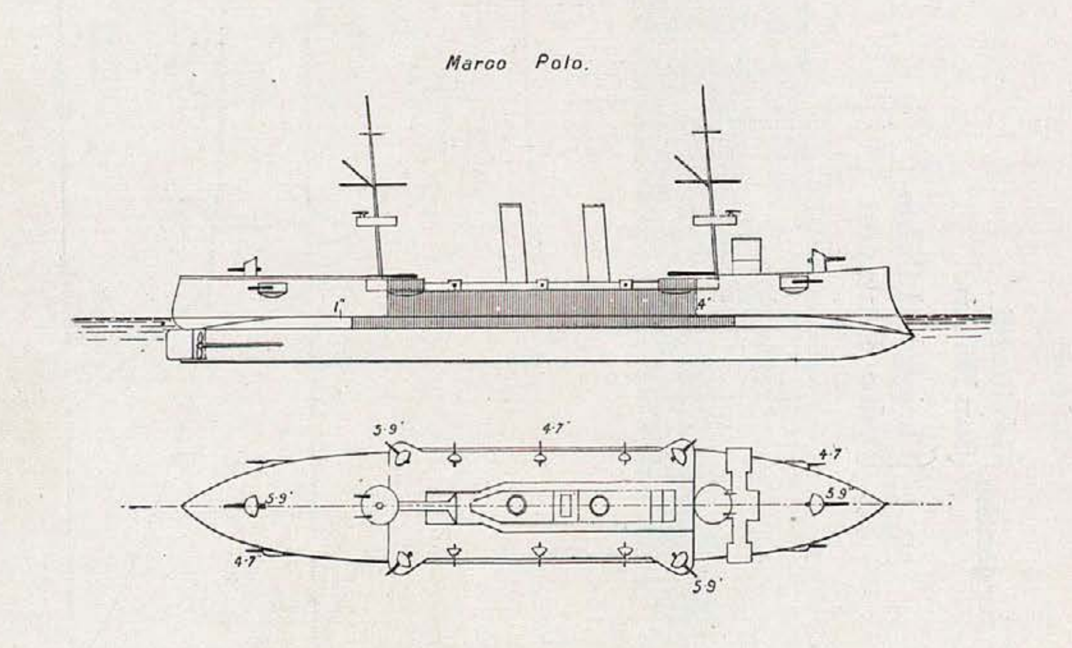


ITALY

Italia.
Lepanto.

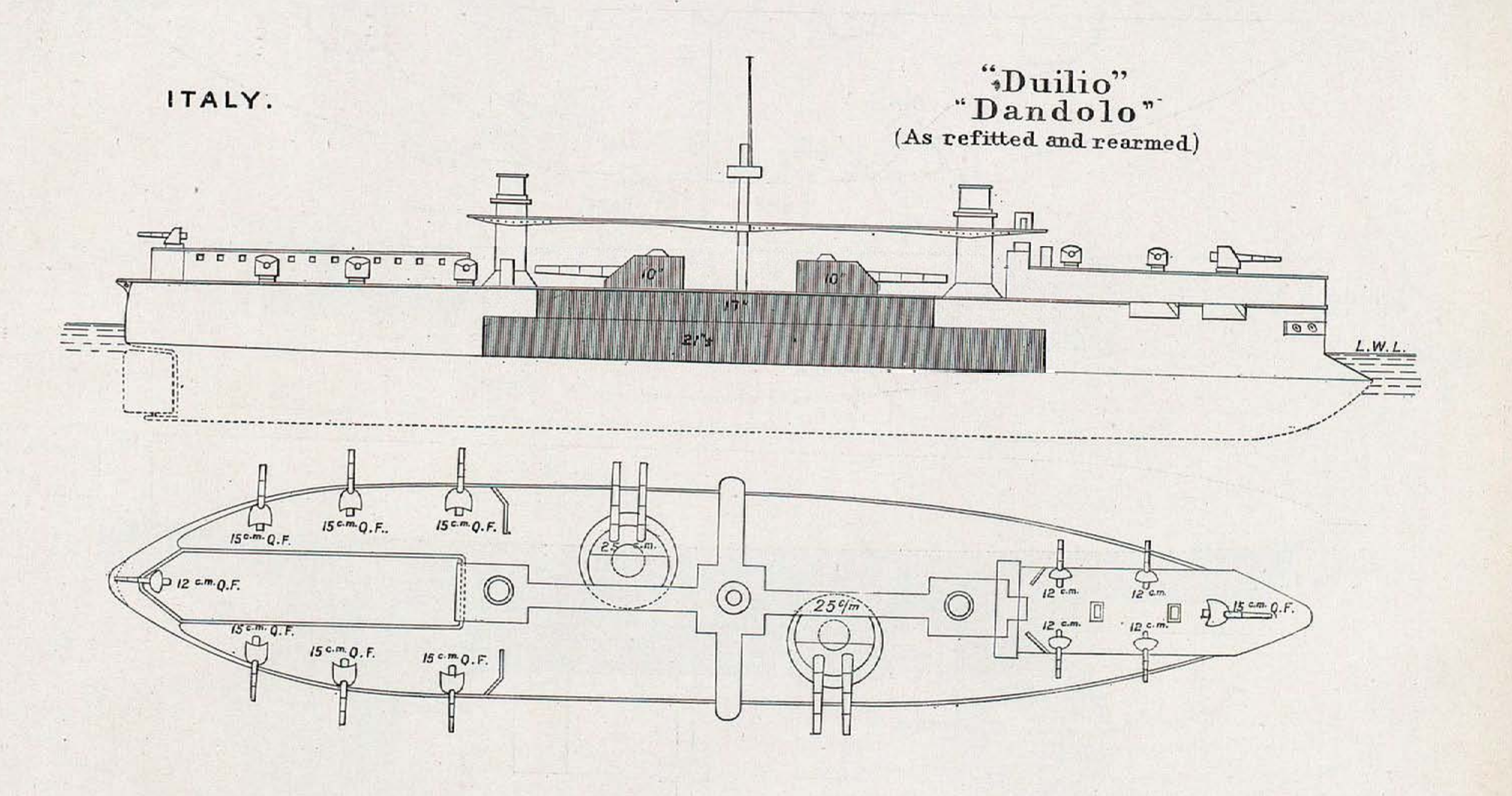
19"
16"
3"
6" 6" 6"
17"
6
6"
4·7"

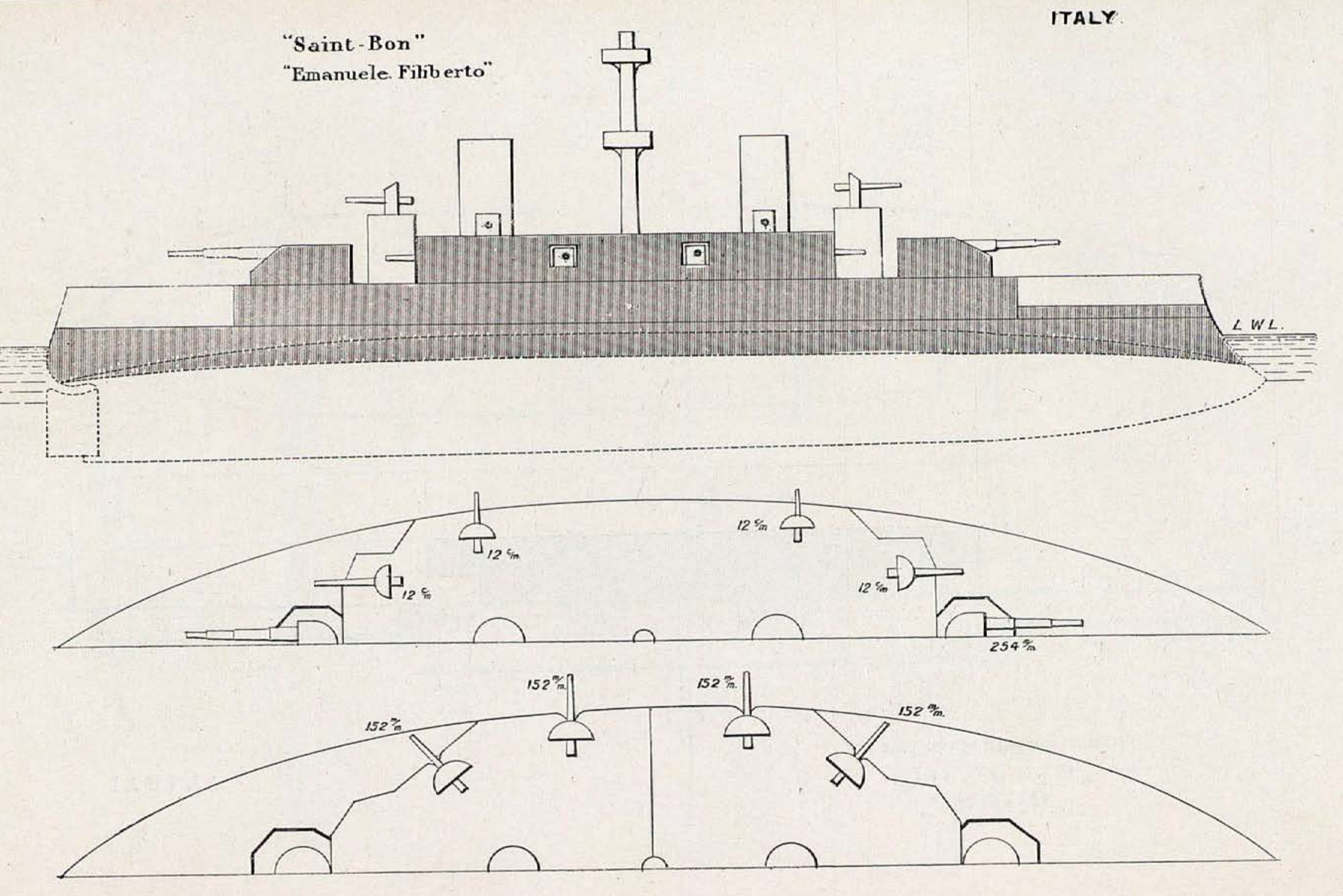
Marco Polo.

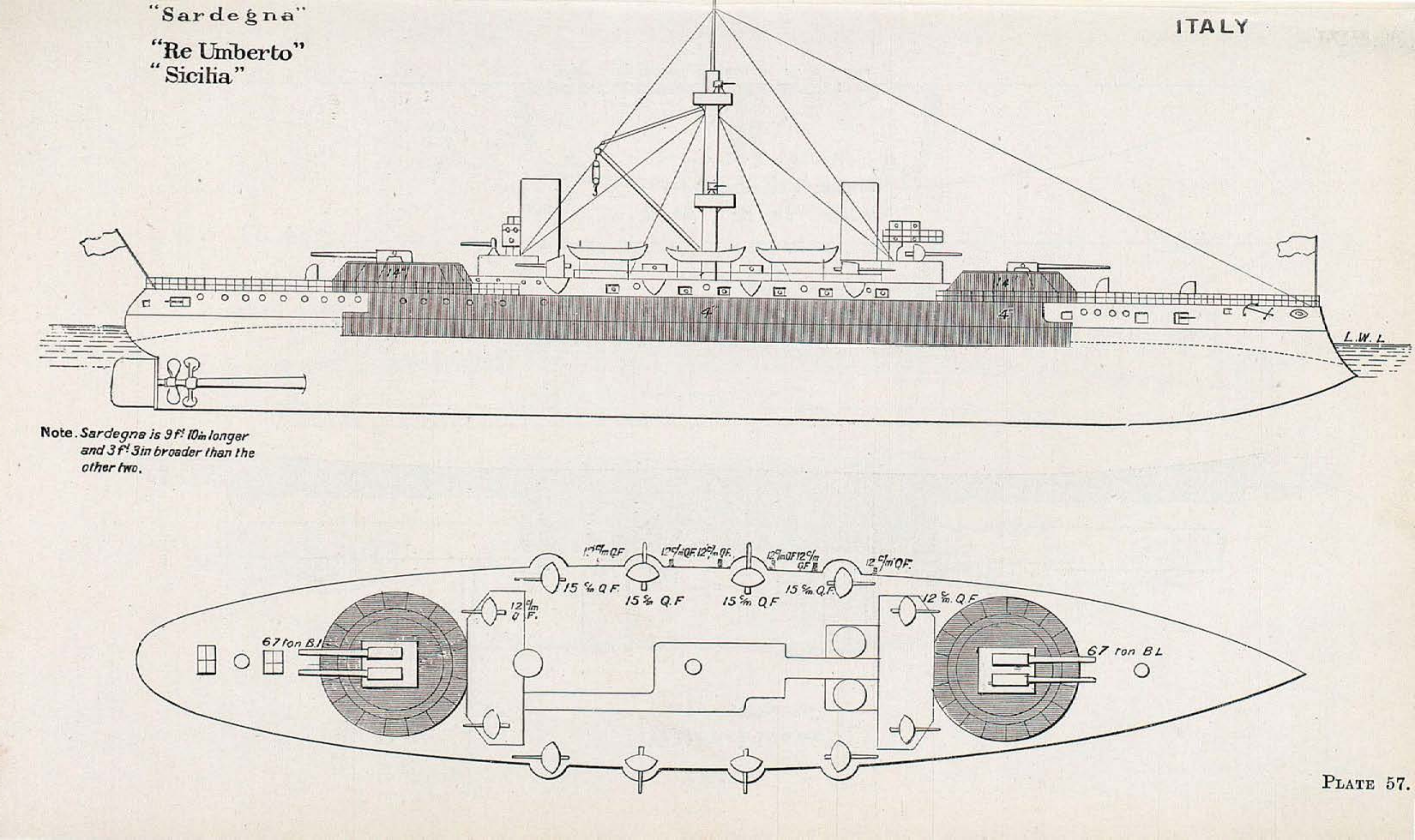


ITALY.

"Duilio"
"Dandolo"
(As refitted and rearmed)




"Saint-Bon"
"Emanuele Filiberto"
L W L.
12 c/m
12 c/m
12 c/m
12 c/m
254 m/m
152 m/m
152 m/m
152 m/m
152 m/m


"Sardegna"
"Re Umberto"
"Sicilia"
14"
4"
4"
L.W.L.
Note. Sardegna is 9 ft. 10 in. longer and 3 ft. 3 in. broader than the other two.
67 ton B.L.
12 c/m Q.F.
15 c/m Q.F.
15 c/m Q.F.
15 c/m Q.F.
15 c/m Q.F.
12 c/m Q.F.
67 ton B.L.

ITALY

"Vettor-Pisani"

"Carlo-Alberto"

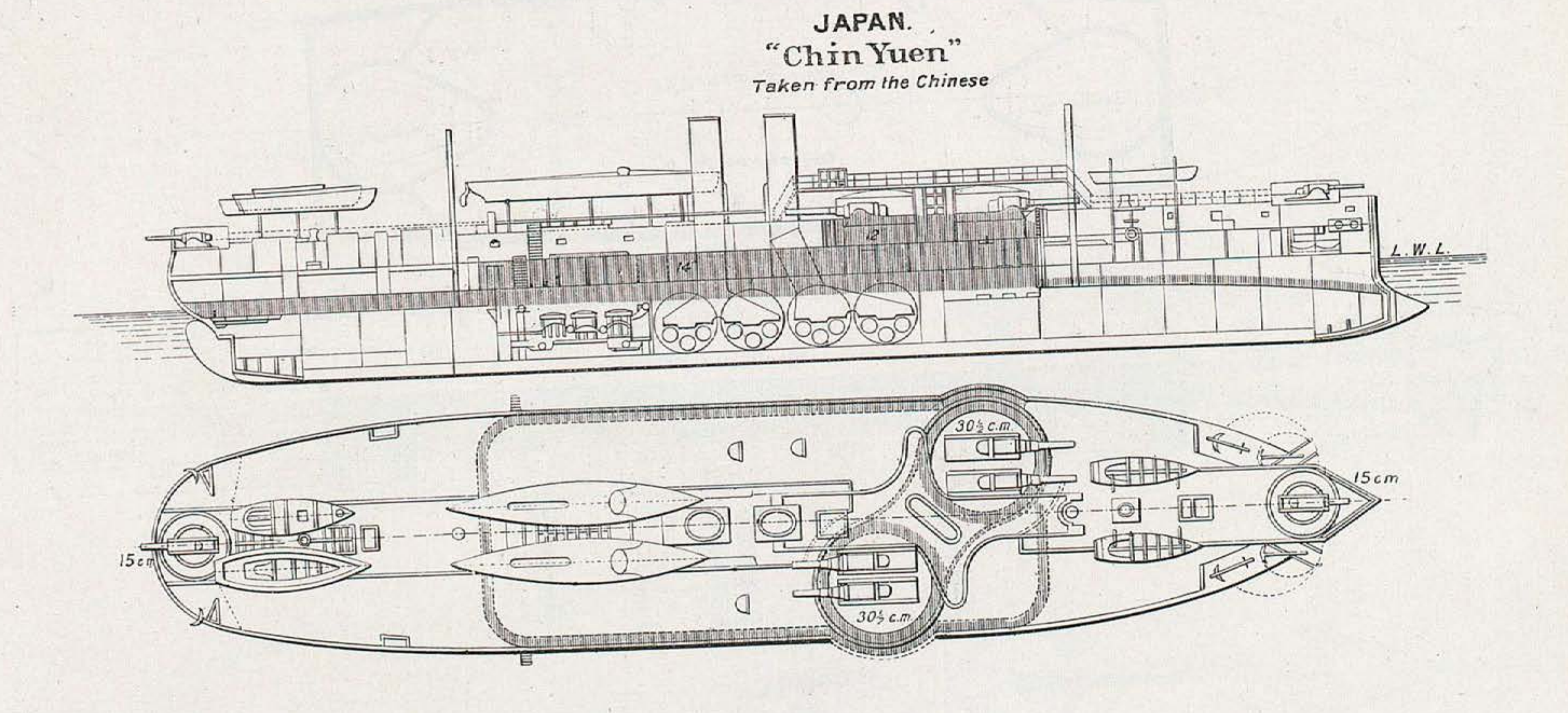
6"
6"
L.W.L.

152 m/m Q.F
12 m/m Q.F
12 m/m Q.F
152 m/m Q.F
6 in
6 in
12 m/m Q.F
12 m/m Q.F

152 m/m Q.F
152 m/m Q.F
152 m/m Q.F
152 m/m Q.F
57 m/m Q.F
Light Screen
6 in
6 in

Light Longitudinal Screen at Middle line

Plate 58.


JAPAN.
"Chin Yuen"
Taken from the Chinese
L. W. L.
14
12
15cm
30½ c.m.
30½ c.m.
15cm

JAPAN.

FIRST CLASS BATTLESHIPS

"Fuji"

"Yashima"

C

D

4"

18"

$2\frac{1}{2}$" Armoured Steel Deck

A

Armoured Belt on Water Line 18"

B

Armoured Steel Deck $2\frac{1}{2}$"

6" Q.F.

18" Armour

6" Q.F.

6" Q.F.

6" Q.F.

6" Casemates

12 in B.L.

$2\frac{1}{2}$"

14" Armour

$2\frac{1}{2}$" Armoured Deck

14" Armour

12 in B.L.

4" Armour

4" Armour above Belt.

A.B. Lower Citadel.

C.D. Upper Citadel

Plate 60.

JAPAN.

"Itsukusima"
"Hashidate"

2"

12 c/m.

12 c/m.

12 c/m.

12 c/m.

12 c/m.

32 c/m. B L

Japan.

"Shikishima"

14.850 Tons. 14.500 IHP.
Building at the Thames Iron Works.

Plate 62.

JAPAN

"Tatsuta."

On Special Scale

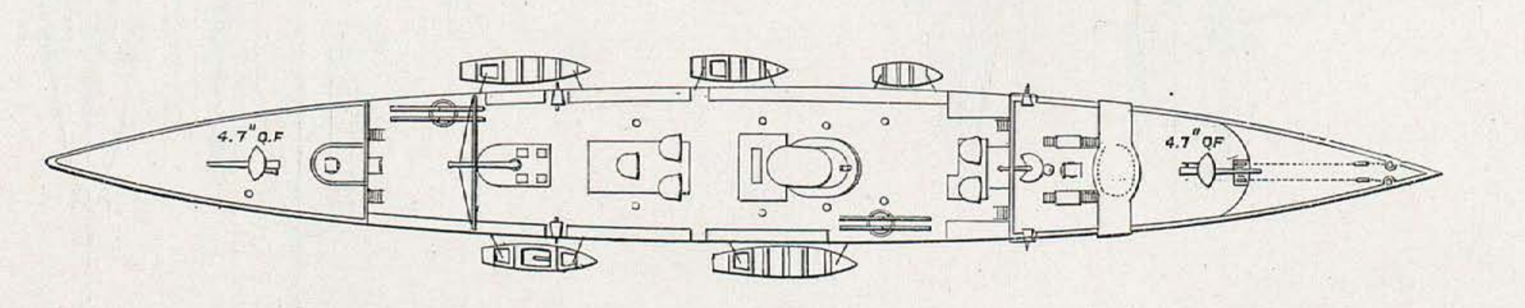
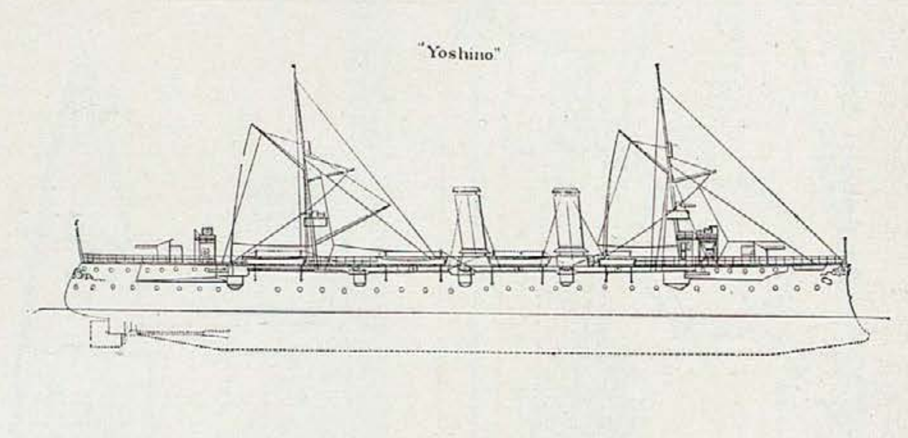
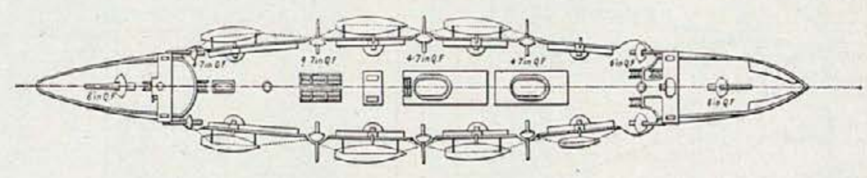


Plate 63.

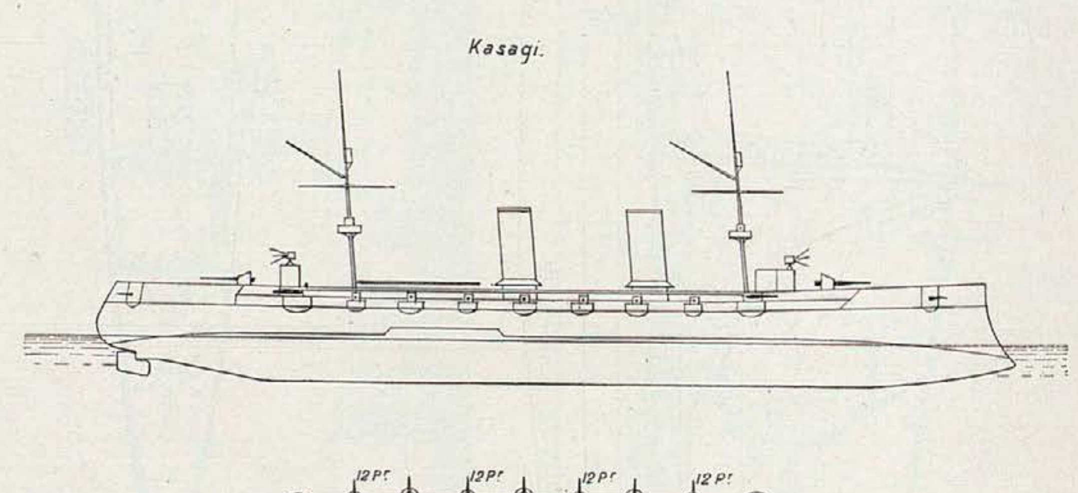
JAPAN

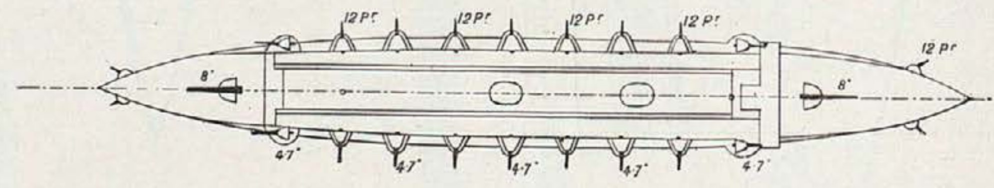
"Yoshino"





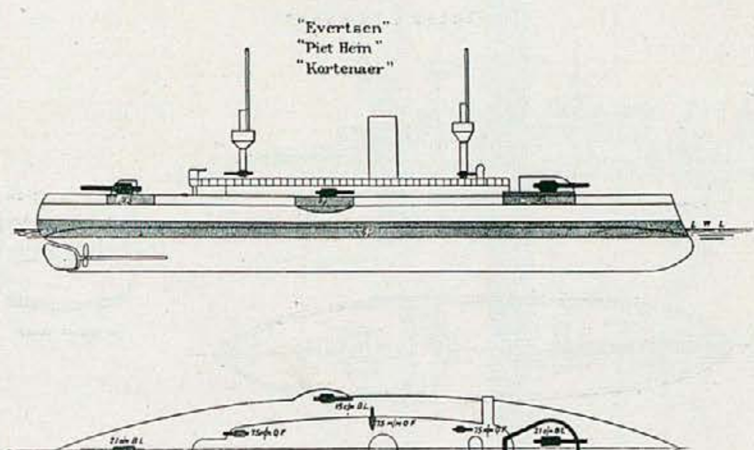
Kasagi.

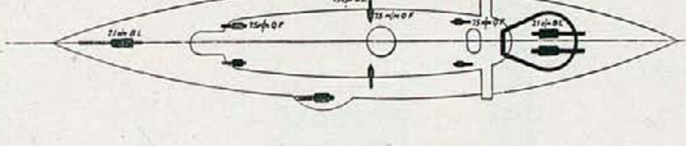




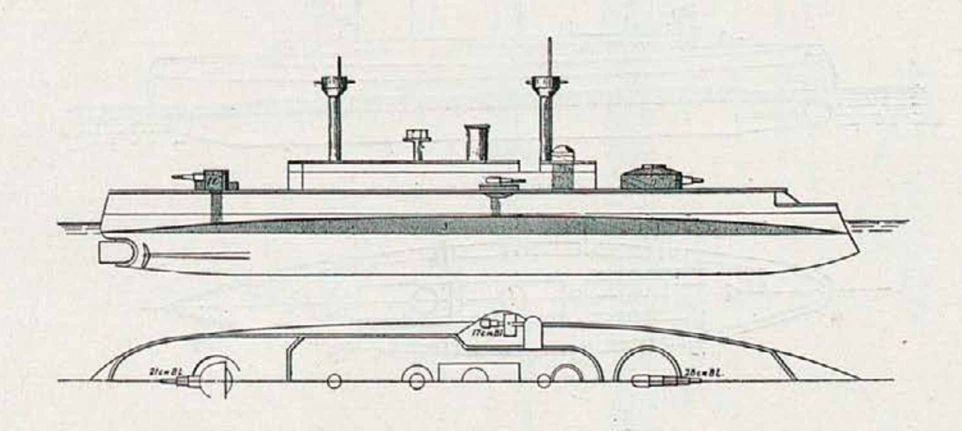
NETHERLANDS

"Evertsen"
"Piet Hein"
"Kortenaer"

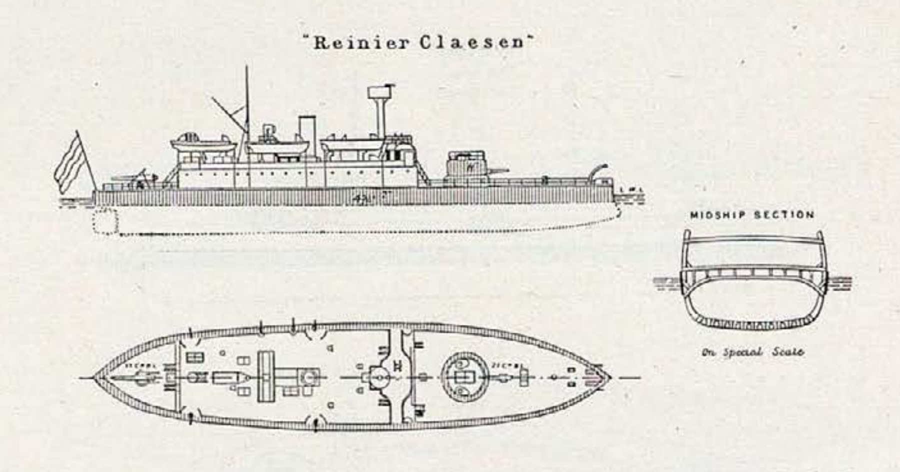


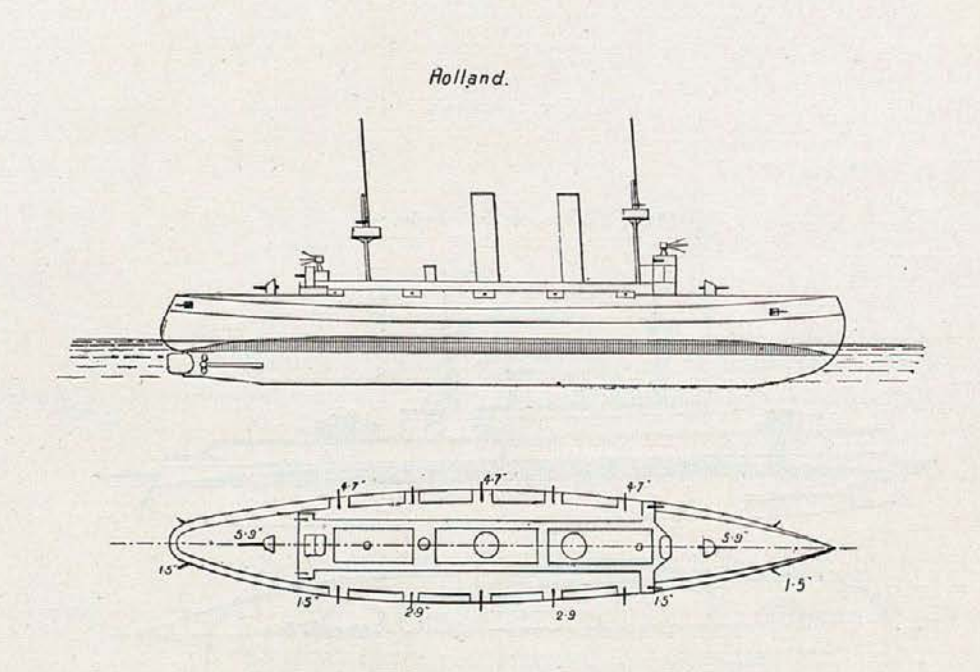


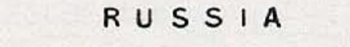
Koningin Wilhelmina de Nederlanden.



NETHERLANDS







RUSSIA

"Admiral Nachimoff

PLATE 67.

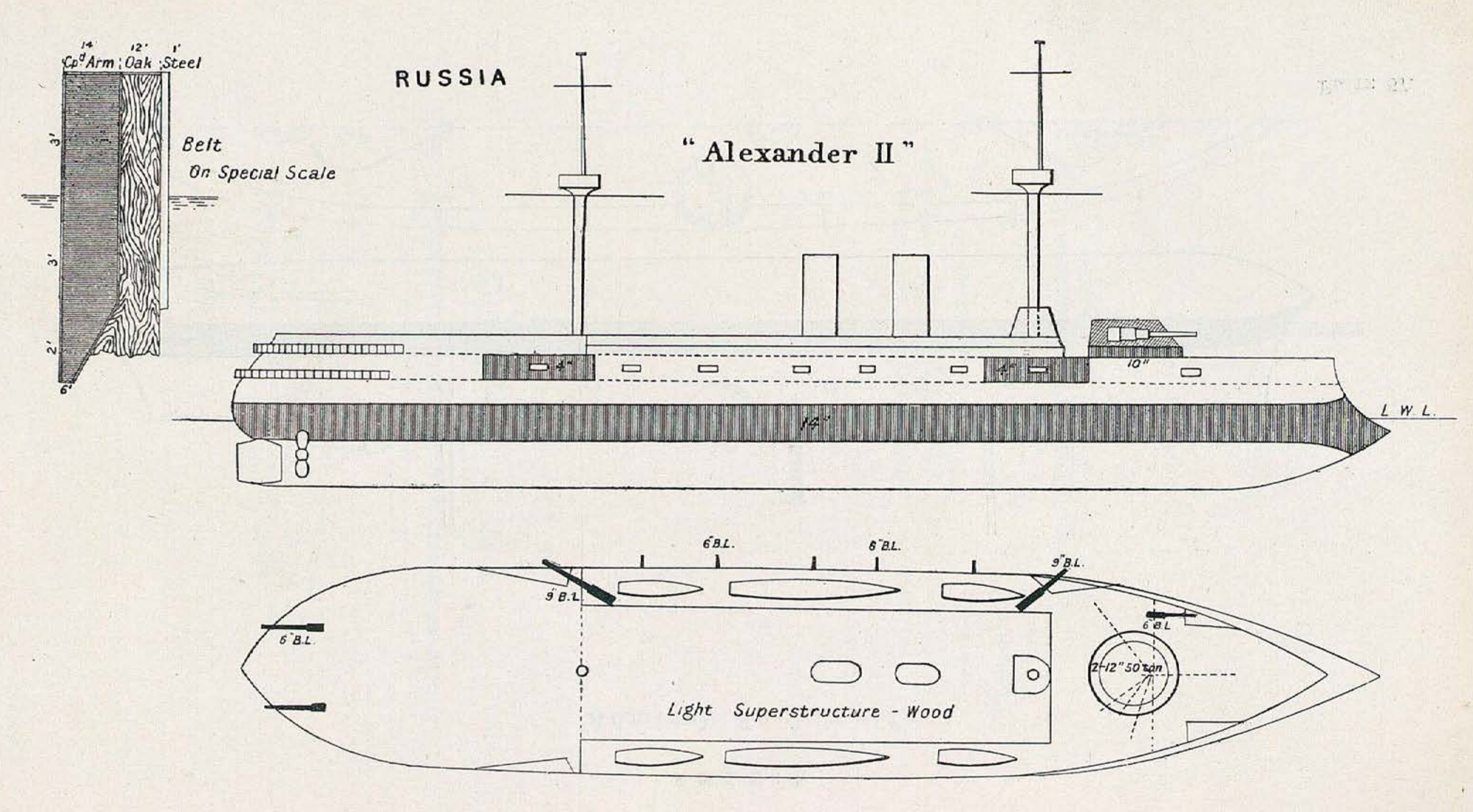

RUSSIA
"Alexander II"
14
Cpd Arm
12'
Oak
1'
Steel
Belt
On Special Scale
3'
3'
2'
6'
4"
4"
10"
14"
L. W. L.
6" B.L.
6" B.L.
9" B.L.
9" B.L.
6" B.L.
6" B.L.
2-12" 50 ton
Light Superstructure - Wood

Plate 68.

RUSSIA.

"Catherine II."
"Tchsmé."
"Sinope."

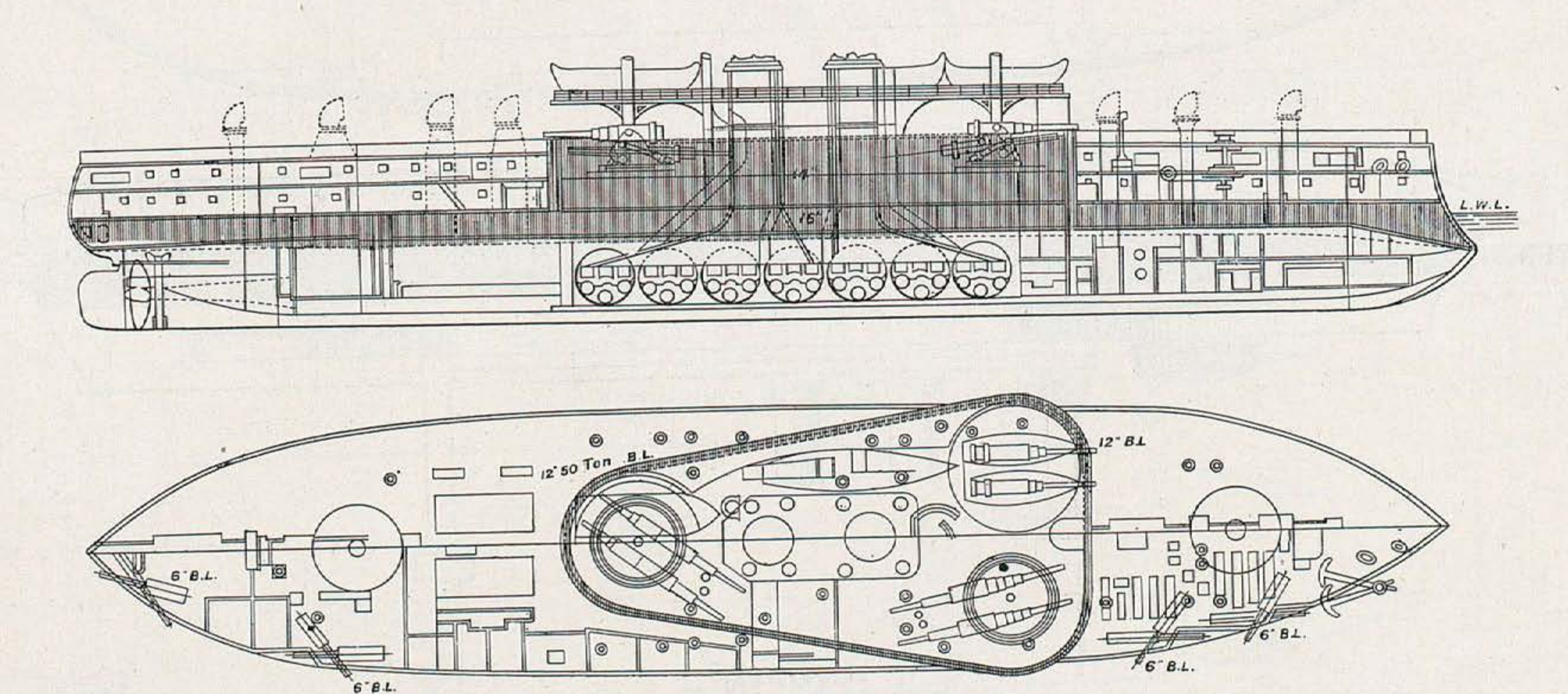


PLATE 69.

RUSSIA

" Nicolai I. "

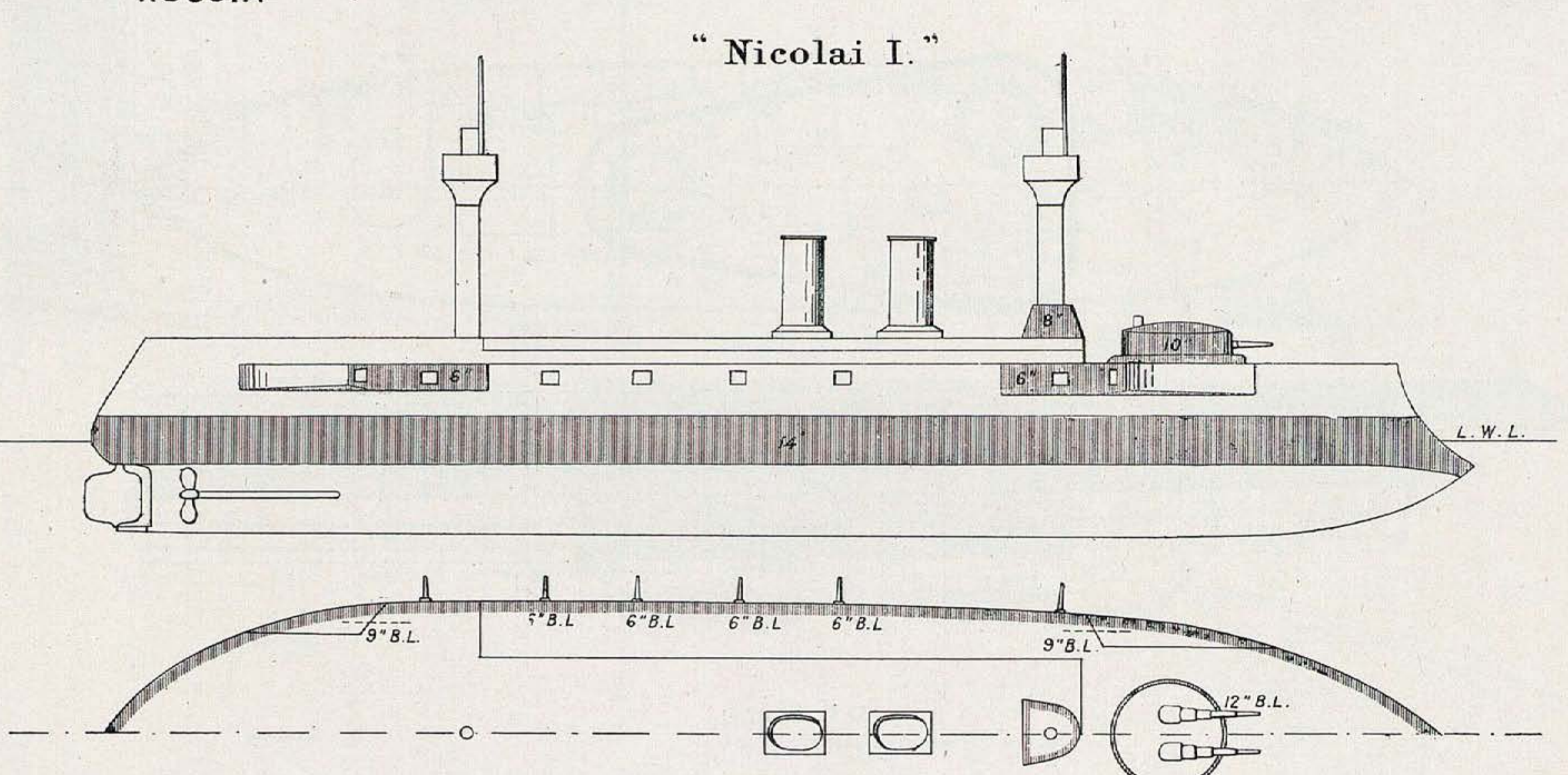


Plate 70.

RUSSIA

"Pamyat Azova."

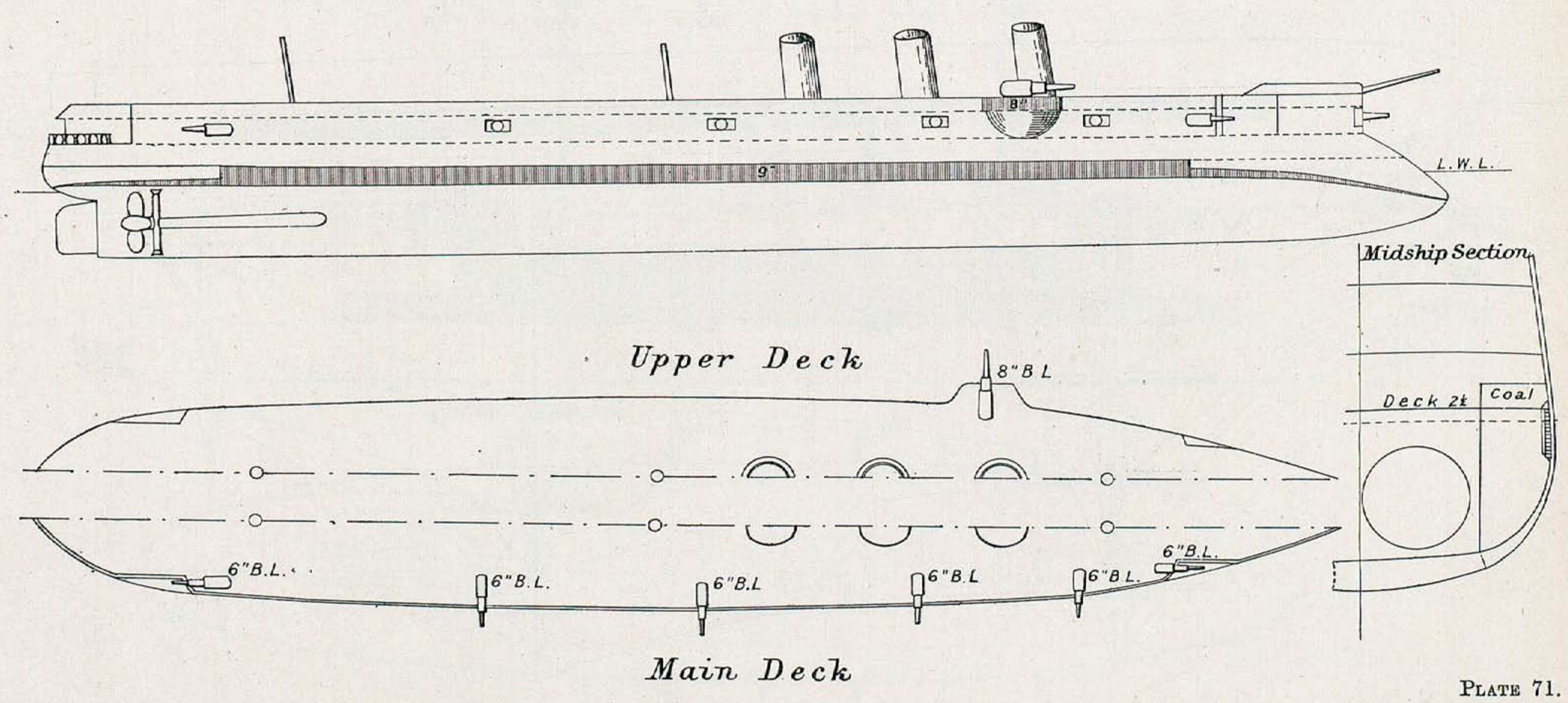


PLATE 71.

First Class Cruiser "Rurik."

10"
L.W.L.
6" Q F.
8"
6" Q.F.
6" Q.F.
4"·7 Q.F.
6" Q.F.
4"·7 Q.F.
6" Q.F.
6" Q.F.
4"·7 Q.F.
6" Q.F.
8"
6" Q.F.
Br.

RUSSIA

"Sissoi Veliky"

14"

14"

5"

15 3/4"

L.W.L.

15 C^m Q.F.

15 C^m Q F

15 C^m Q F

30·5 C^m

30·5 C^m

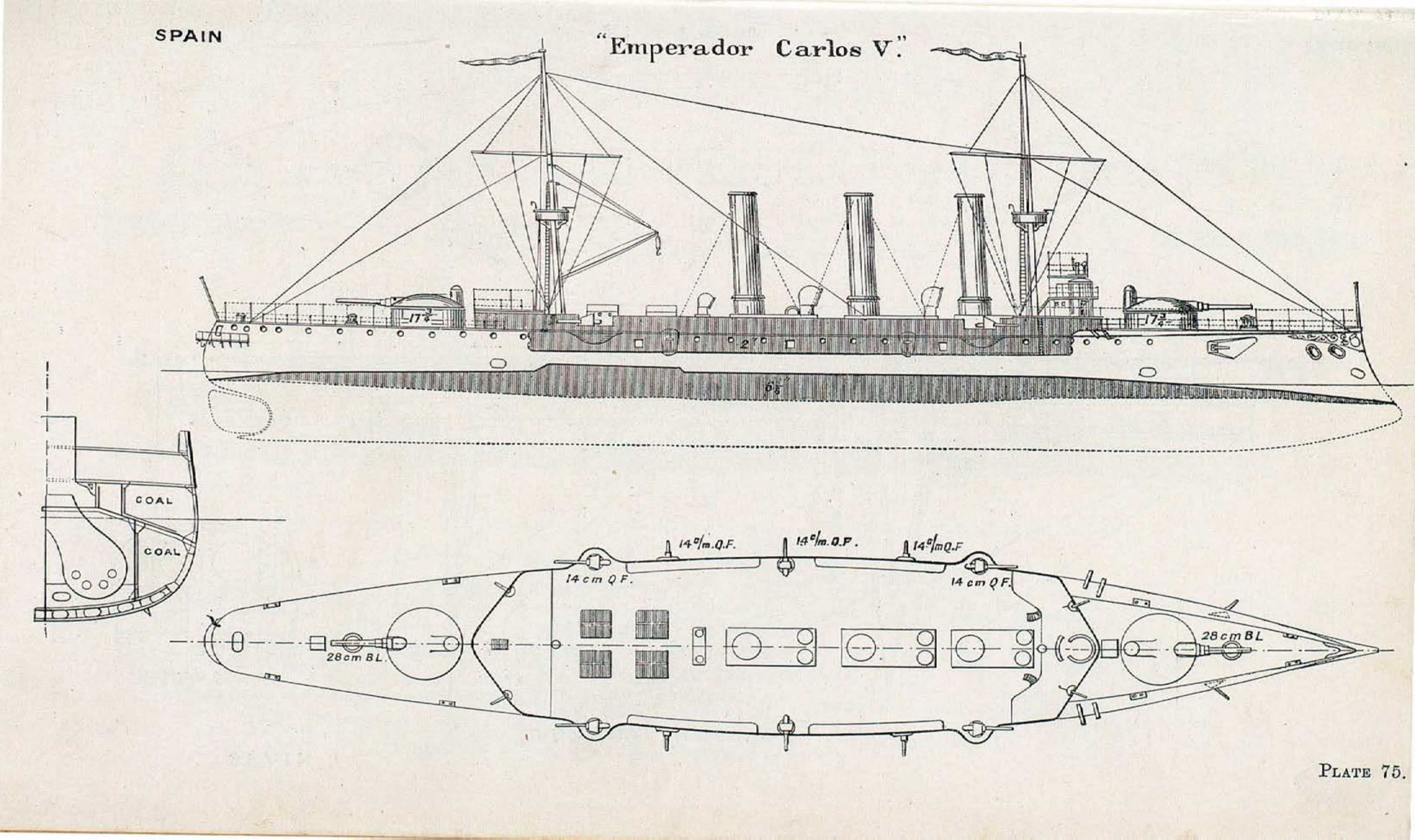
RUSSIA.

"Tria Sviatitelia"

16"
5"
5"
16"
16"
16"
13"—16"
3 in
3 in
L.W.L.
5·9" Q.F.
5·9" Q.F.
5·9" Q.F.
5·9" Q.F.
4·7" Q.F.
4·7" Q.F.
12" B.L.
12" B.L.

PLATE 74.

"Emperador Carlos V."



SPAIN

"Almirante Oquendo"
"Catalīna"
"Cardenal Cisneros"
"Infanta Maria Téresa"
"Princessa de Asturias"
"Vizcaya"

Midship Section.

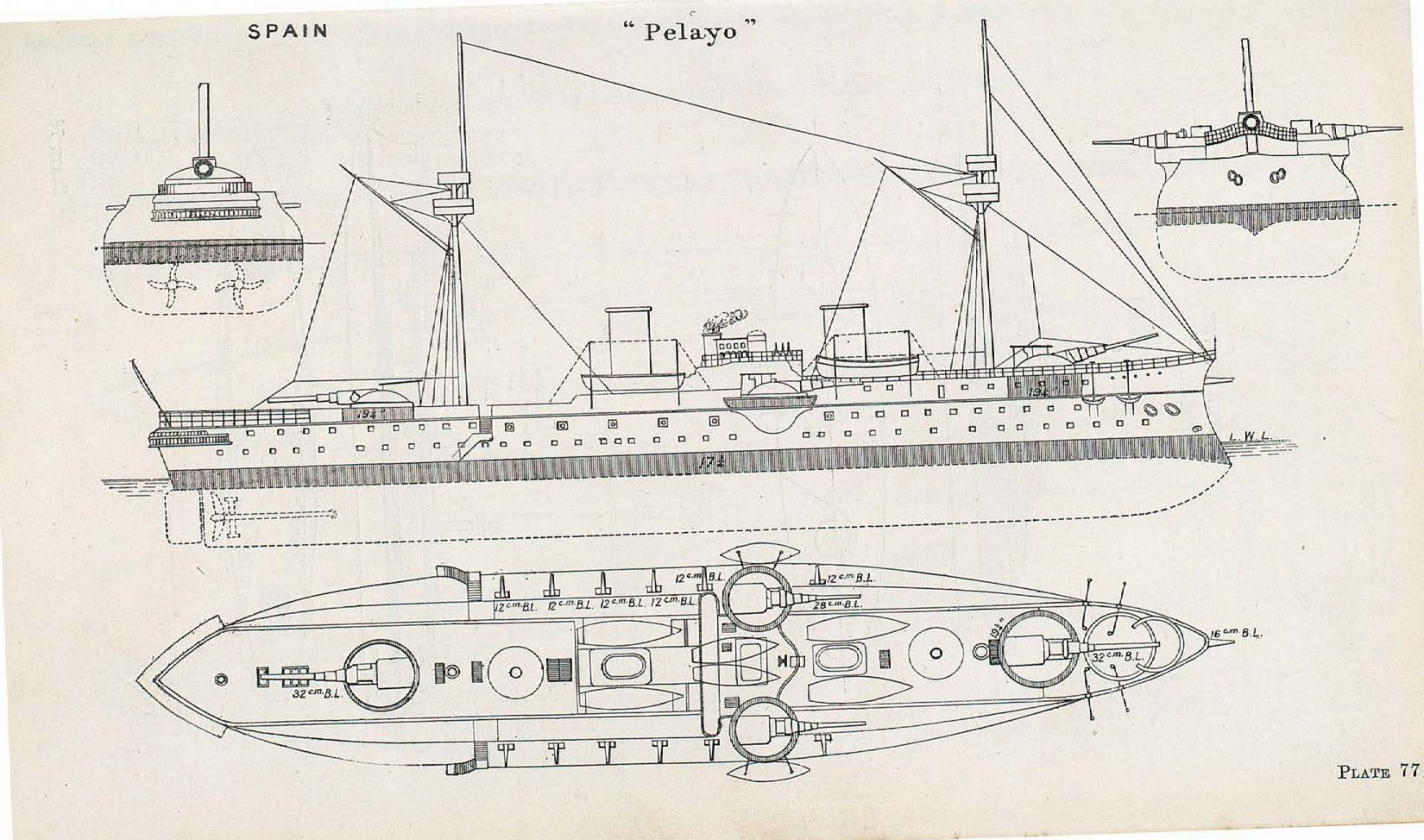
Coal Coal Coal Coal

10½" 12" 10½" 12" L.W.L.

14 c.m. B.L. 14 c.m. B.L. 14 c.m. B.L. 14 c.m. B.L. 14 c.m. B.L.

28 c.m. B.L. 28 c.m. B.L.

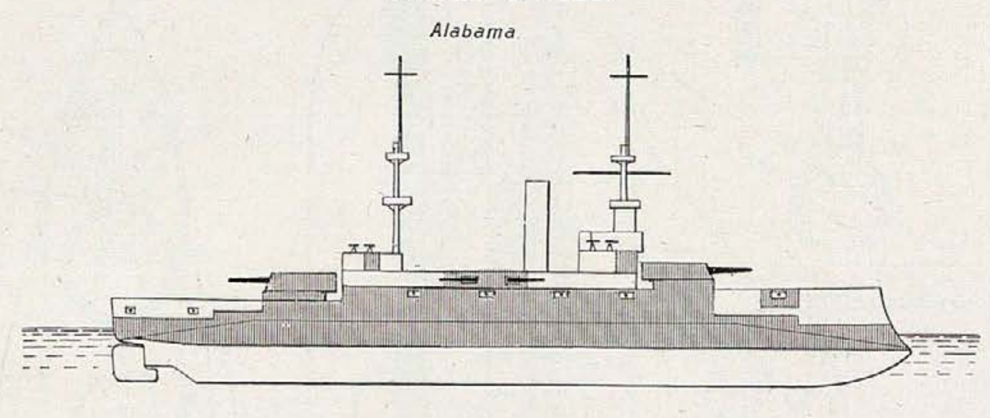
"Pelayo"

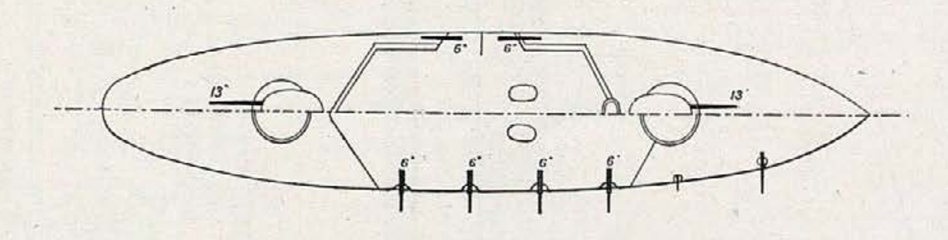


L. W. L.
19¼"
19¼"
17½
12 c.m. B.L.
12 c.m. B.L.
12 c.m. B.L.
12 c.m. B.L.
12 c.m. B.L.
12 c.m. B.L.
12 c.m. B.L.
28 c.m. B.L.
32 c.m. B.L.
32 c.m. B.L.
16 c.m. B.L.
19¼"

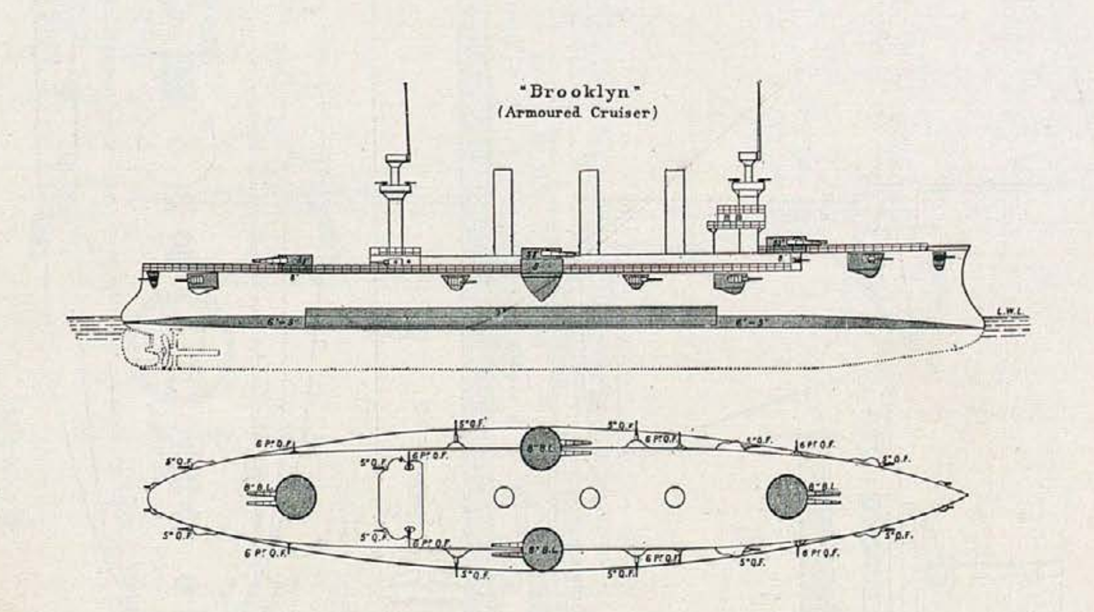
UNITED STATES.

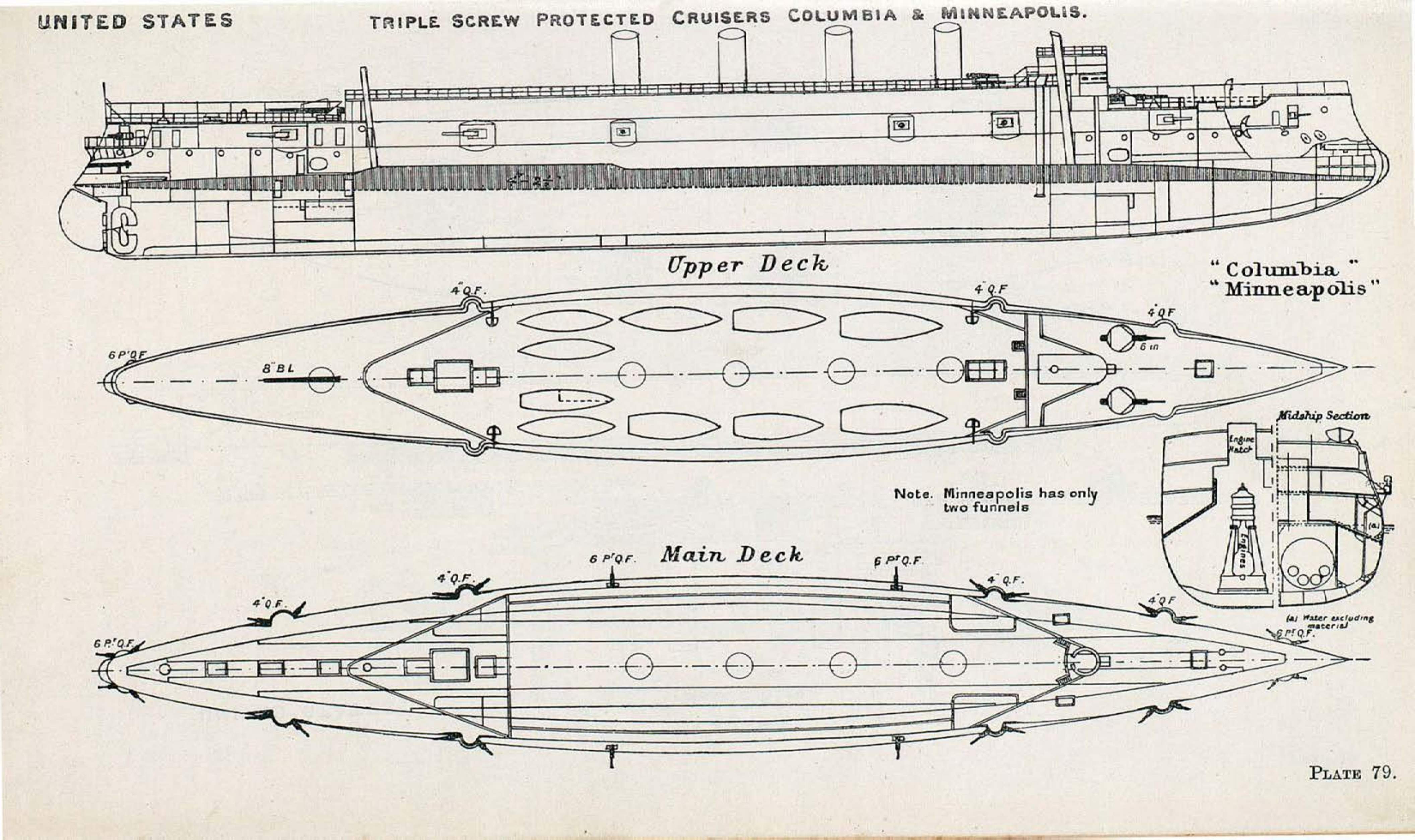
Alabama





"Brooklyn"
(Armoured Cruiser)




UNITED STATES
TRIPLE SCREW PROTECTED CRUISERS COLUMBIA & MINNEAPOLIS.
Upper Deck
"Columbia"
"Minneapolis"
4" Q.F.
4" Q.F
4" Q.F
6 in
6 P'Q.F
8" B L
Midship Section
Engine Hatch
Engines
(a)
(a) Water excluding material
Note. Minneapolis has only two funnels
Main Deck
6 P'Q.F.
4" Q.F.
6 P' Q.F.
PLATE 79.

UNITED STATES.

"Iowa."
(Battle Ship)

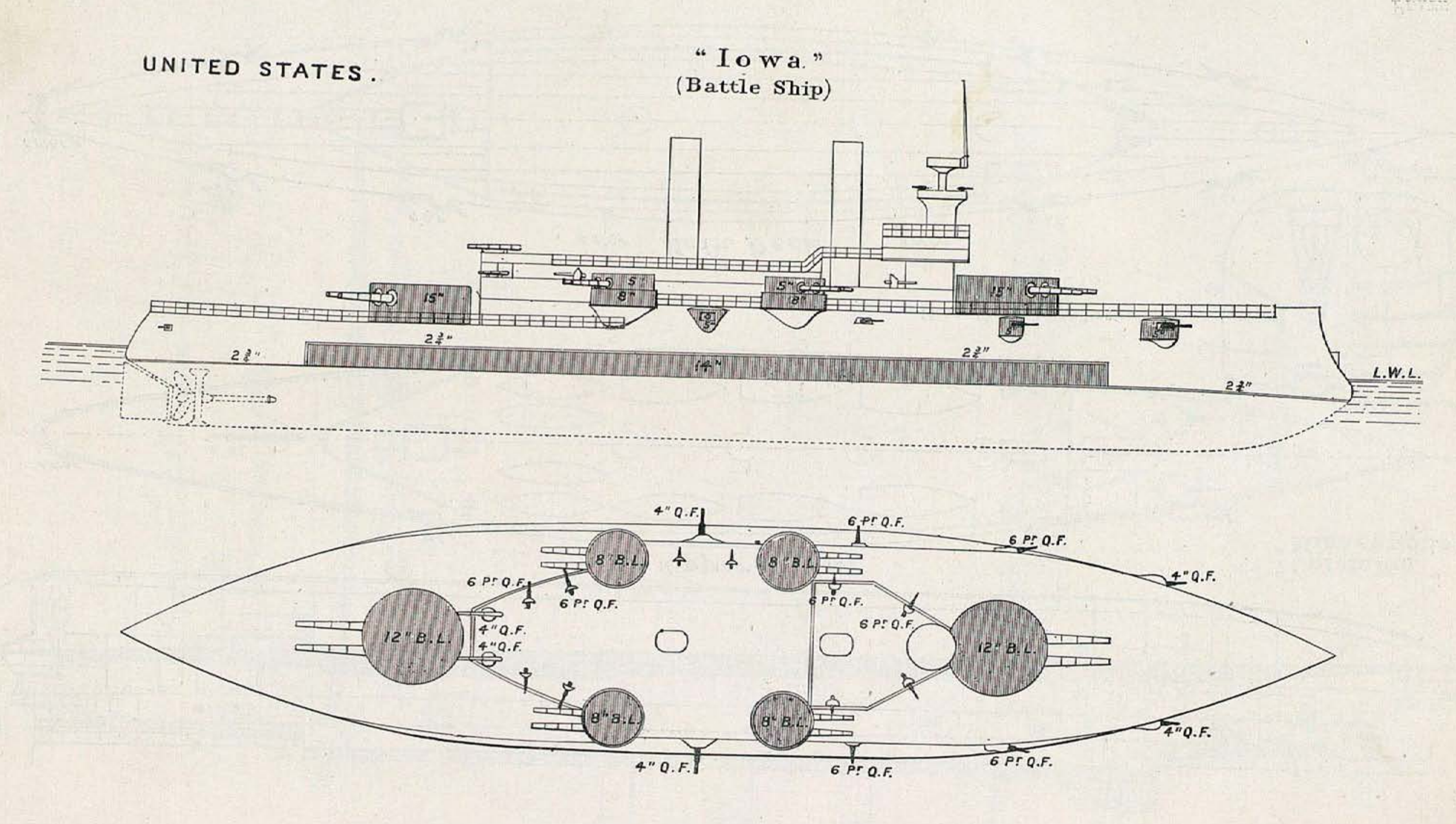


Plate 80.

UNITED STATES.

No. 5 (Kearsage)
" 6 (Kentucky)
(Battle ships)

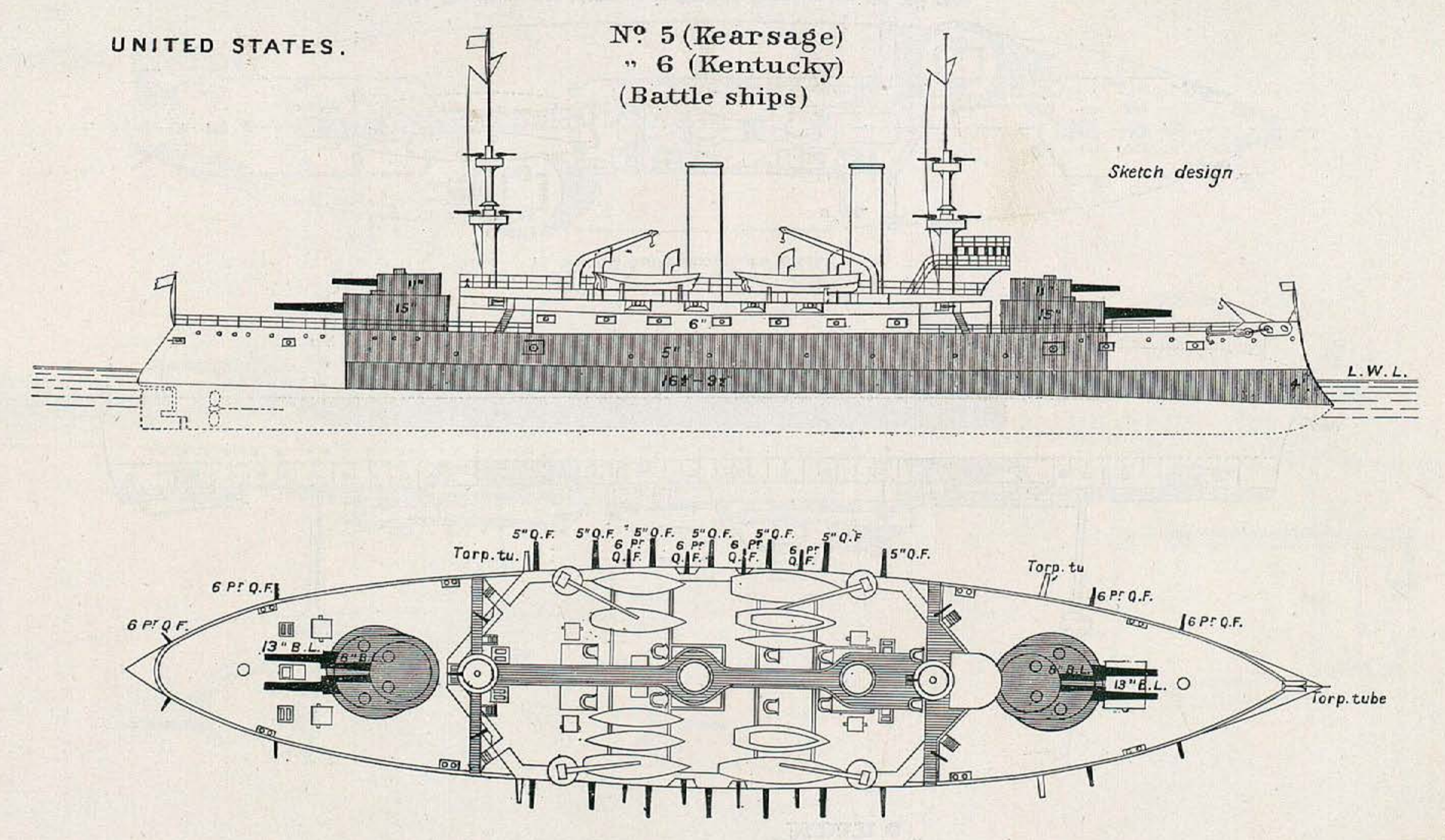
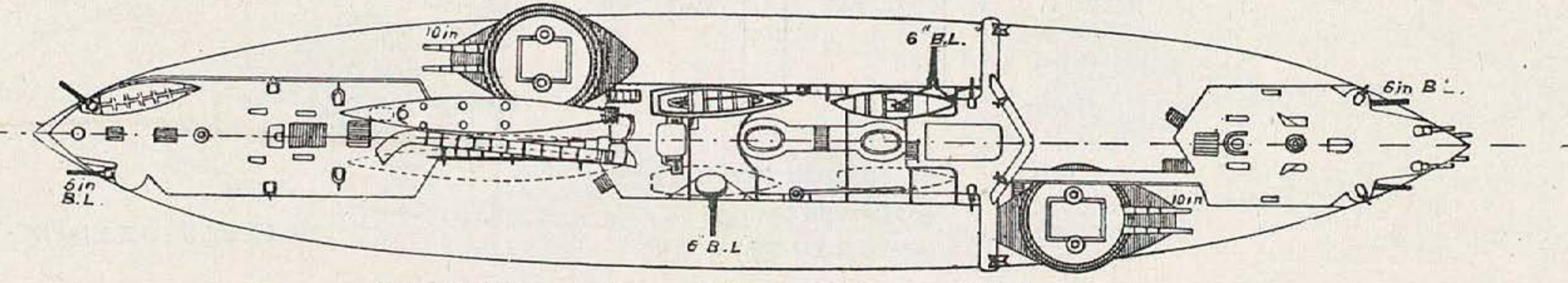


Plate 81.

UNITED STATES

Armoured Cruiser "Maine"

Main & Superstructure Decks



Note. *The Maine was blown up in Havana harbour on Feb 15th 1898*

UNITED STATES

Coast Defence Ship
" Monterey "

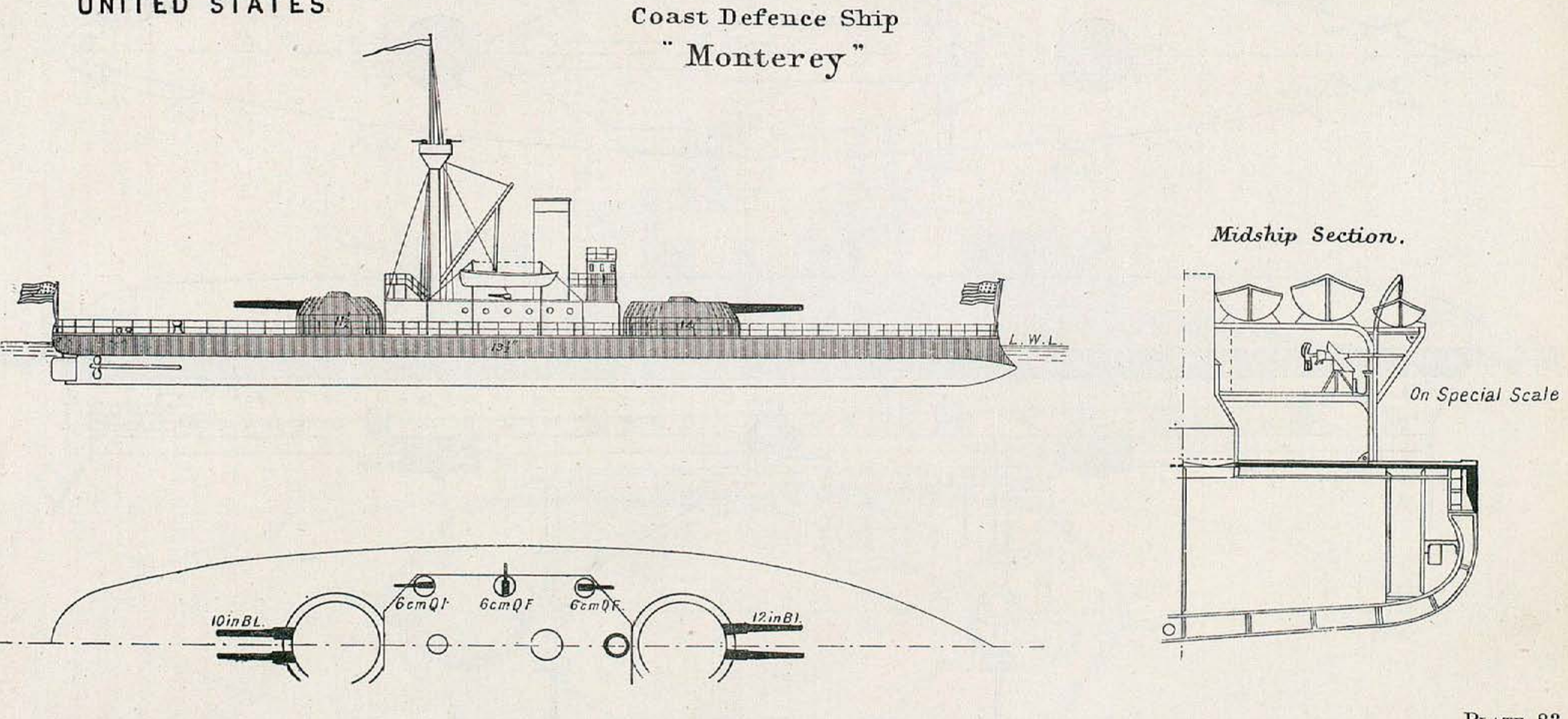


Plate 83.

UNITED STATES

ARMOURED CRUISER.

"New York"

Plate 84.

UNITED STATES

BATTLE SHIPS.

"Oregon"
"Massachusets"
"Indiana"

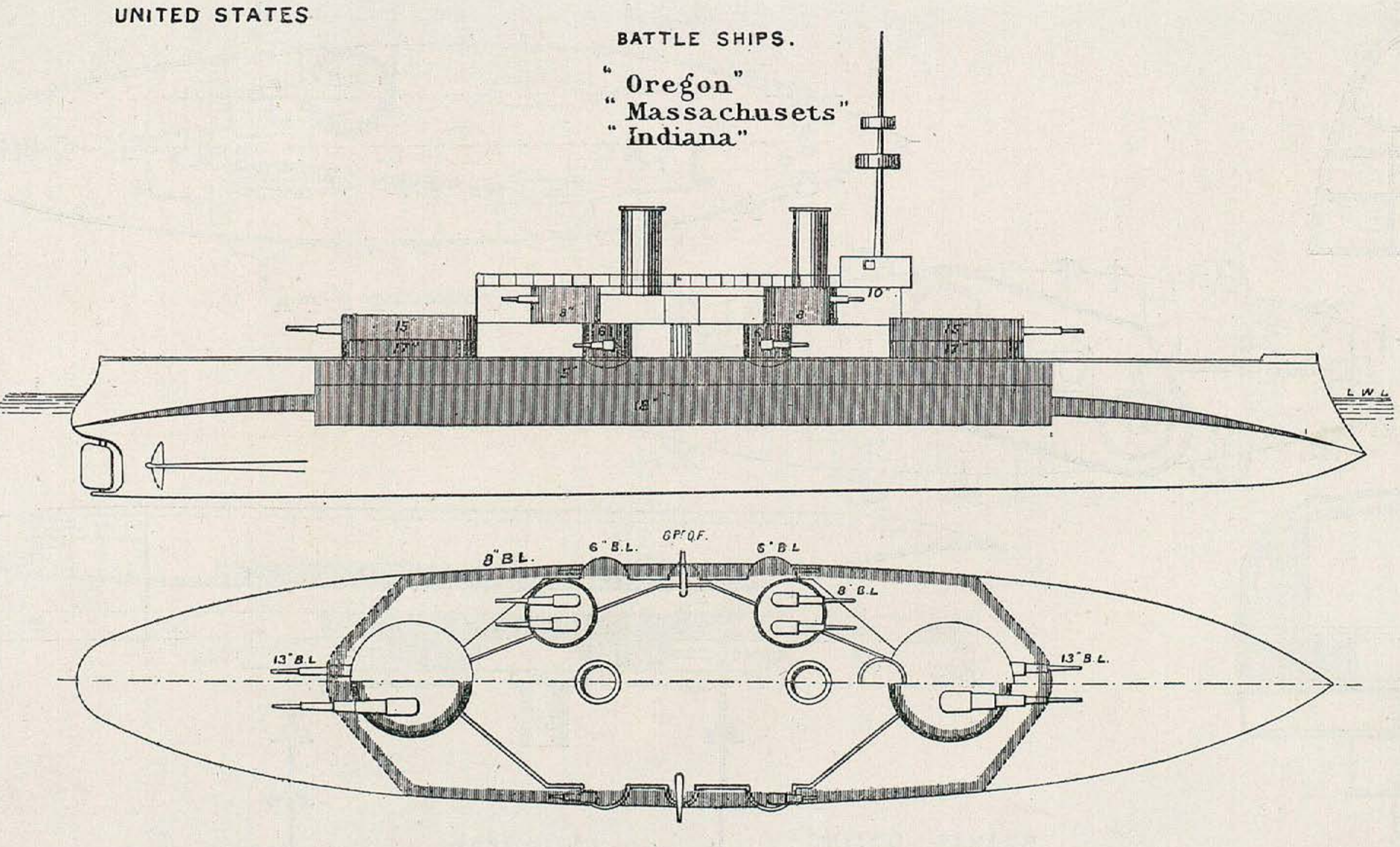


PLATE 85.

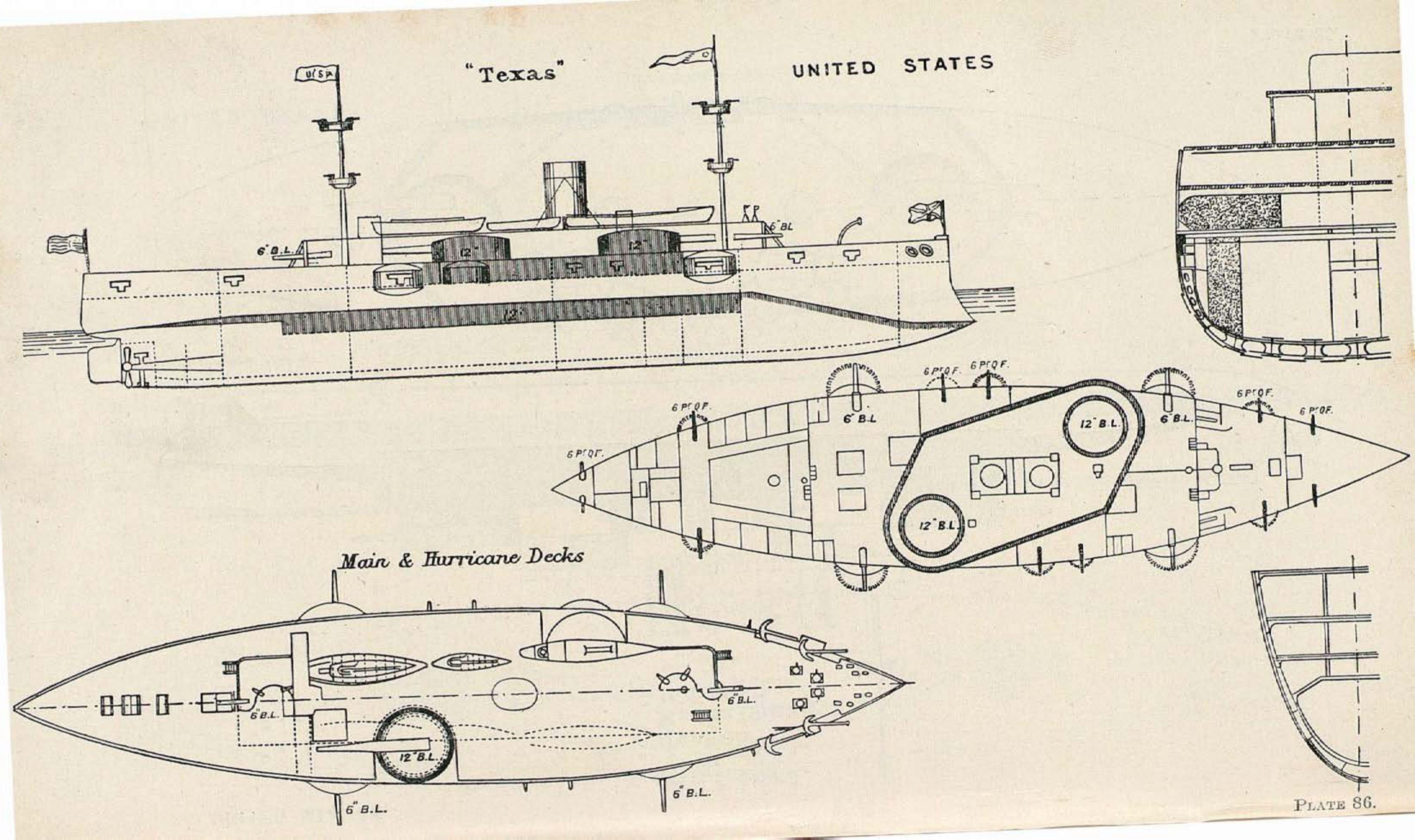

"Texas"
UNITED STATES
U.S.A.
6" B.L.
12"
6" B.L.
6 Pr Q.F.
6" B.L.
12" B.L.
Main & Hurricane Decks
6" B.L.
12" B.L.

PLATE 86.

PART III.

ARMOUR AND ORDNANCE.

PART III.

Armour and Ordnance.

CHAPTER I.

Armour.

It is very satisfactory to find that our Sheffield firms have made thick armour as excellent as the thinner plates dealt with in last year's *Annual*. It may be doubtful whether thick or thin plates are more important, but there can be no question that the manufacture of the former is by far the more difficult. Furthermore, it may be easily seen that the usual tests applied, which are primarily based on perforation, tax thick plates more severely than thin ones as to fracture. Take, for example, the thin and thick Vickers plates given hereafter; the thickness of wrought iron which the attacking shot should perforate was respectively 2·24 and 2·05 times the thickness of the actual plate, being thus greater in the case of the thin shield; but the striking energies per ton of plate are respectively 505 and 1169 ft.-tons, the strain on the thick plate being thus shown to be out of all comparison to that on the thin. And, while this method of estimation is very rough, it certainly represents a real and important element more or less perfectly, because the width of plates is by no means proportioned to their thickness. In fact, we have here a plate measuring six feet across attacked by 6-in. projectiles forming a wedge one-twelfth the width of the plate, and a 12-in. shot forming one one-seventh of the width of a 7-ft. plate. It will be seen that the $11\frac{1}{18}$-in. plate which has given the excellent results shown hereafter is a test plate made to learn what can be achieved and

Authorities.—The *Engineer* for plates and matter. The United States official notes on Naval Progress and the report of the chief of the Bureau of Ordnance, furnished by the courtesy of Captain Colwell, U.S. Naval Attaché, and Captain Cowles, late Naval Attaché. *Engineering*. United Service Institution Proceedings, Notes on Naval Matters. Messrs. Vickers, Captain Tresidder of Brown's, Messrs. Cammell, Herr Krupp, Messrs. Schneider, and Mr. Hadfield.

what, it may be hoped, will be supplied shortly. We may well feel satisfied if our ships carry thick and thin plates of the quality represented by the two Vickers plates referred to, especially as thick armour in the United States and elsewhere is accepted on a trial which is mild compared to this of the Vickers plate. It may be observed that the division of armour into thick and thin has a significance which it did not formerly possess, for the armament and scope of attack of our ships now take the shape of two distinct branches, the heavy guns for primary, or belt attack, and the quick-fire pieces for attack of the lighter structural parts, including the conning-tower and the armour covering the enemy's quick-fire guns. This fact must be kept clearly in view in developing the fire of our ships. The 6-in. gun, for example, cannot pretend to attack the belt and casemate armour of a line-of-battleship. There is little use in considering any intermediate structure that might occasionally be met with, so that it is better to recognise that the normal work for the quick-fire guns is the attack of secondary batteries and conning-tower. This means that the projectile required is not the shot which perforates the greatest thickness of armour, but that *which produces most effect on structures covered by from three to six inches of steel*, and most armour approaches the former limit more nearly than the latter. Indeed, at present British quick-fire guns are almost the only ones mounted behind 6-in. shields, and a shell carrying a bursting charge through four inches of steel or into the unarmoured places beneath the guns is a more valuable projectile than a shot. As to our belts, the device of bringing down the horizontal deck to the lower edge so as to form a second defence against any projectile getting through the belt is admirable, but it seems desirable to test its behaviour under the actual attack of the heaviest guns afloat, so as to compare our system of protection with the heavy belts carried by our adversaries.

Importance of A. P. shells for 6-in. guns.

United States Government armour factory proposed.

In the United States a commission has recommended the establishment of a government armour factory, and has called attention to the success of another method than the Harvey.

Capped shot.

Capped shot continues to find favour in the United States and elsewhere. Results seem to confirm the opinion that the main advantage is that of protecting the extreme point of the shot from fracture on first impact on the hard skin of the plate. It is possible to select rare instances when uncapped shot behave fully as well as capped ones, probably because in such instances the extreme point escapes fracture. In short, the function of the cap, whether hard or soft, is to ensure the shot's point against fracture, probably at the cost of a very small increase of resistance, an increase indeed hardly perceptible. As armour with hardened face becomes

more general, caps can scarcely fail to be generally adopted, unless it should be found that Mr. Hadfield's idea of a special form of point for hard-faced armour can be so developed as to prove the better device. If the above reasoning is correct Mr. Hadfield's idea is sound, even though experience may show that the cap gives the best results.

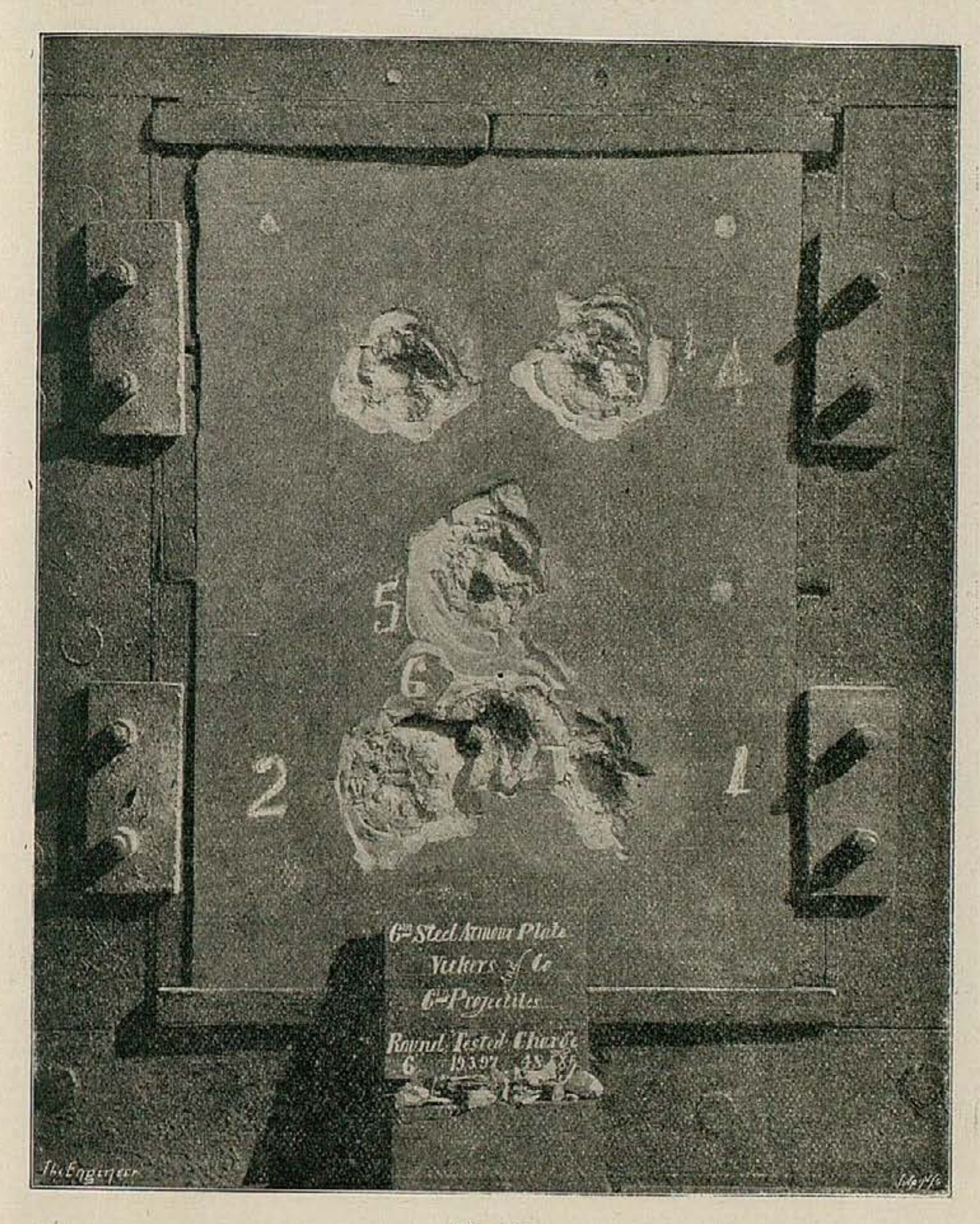


FIG. 1.

The Sheffield firms of Brown, Cammell, & Vickers have met the stringent tests brought in for 6-in. armour plates with complete success, and excellent results have been achieved with all the 6-in. armour submitted on supply. **6-in. armour.**

Vickers armour.

In last year's *Annual* was mentioned the trial of 6-in. Vickers plates on March 19th, 1897. The official photographs were received too late for publication at that time. Figs. 1 and 2 show the front and back of the plate, after receiving not only the five rounds consti-

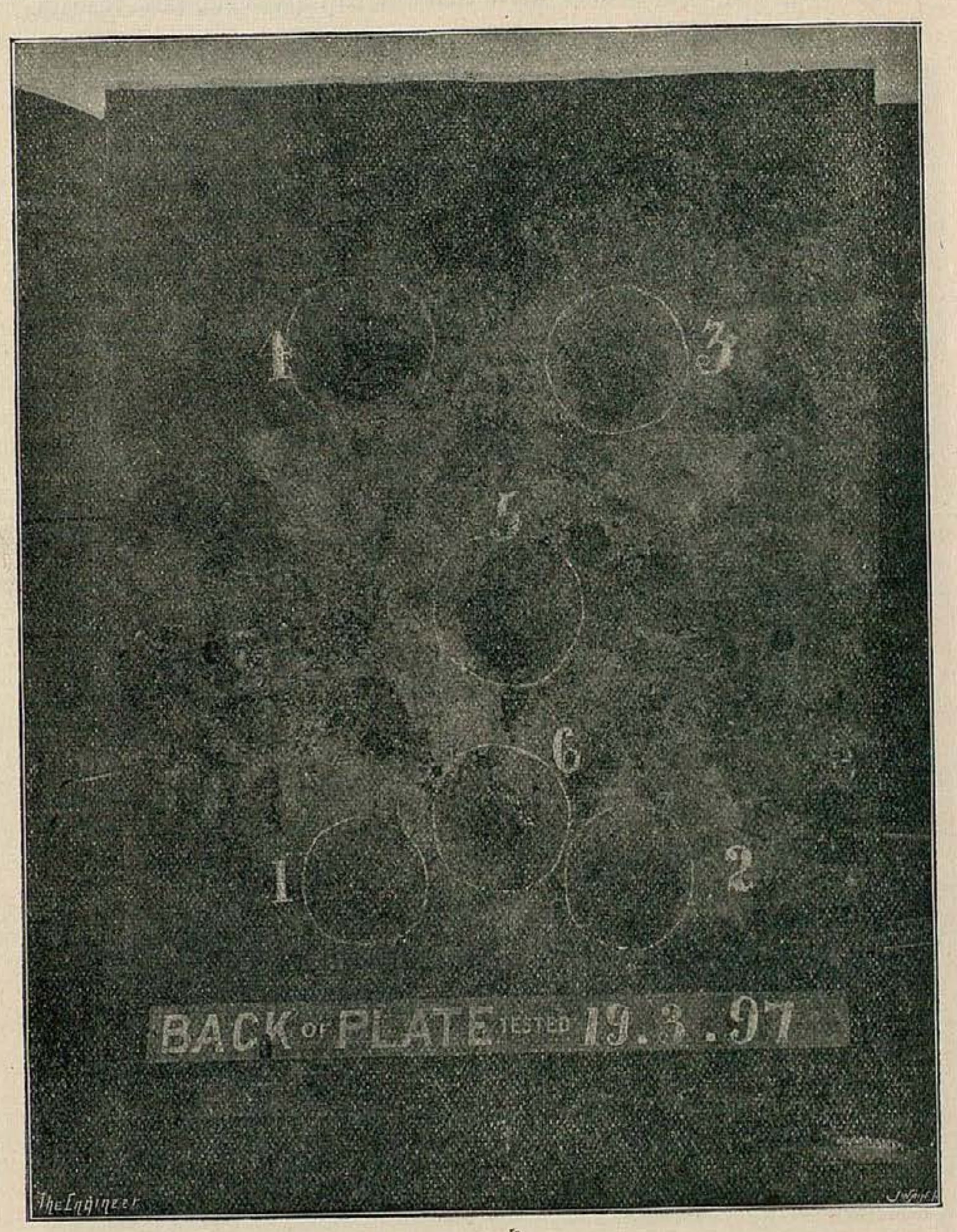


FIG. 2.

tuting the proof, but also an additional one, fired at the request of the makers. The plate in fact defeated the attack of six Holtzer projectiles of 100 lbs. weight, with striking velocity of about 1960 ft.-secs. This implies a shock for each round of 505 ft.-tons per ton of plate, and a perforation of 13·45 in. of iron, 2·24 times the thickness of the

actual plate. It may be seen that the bulges are very slight and the cracking insignificant, so that, although this attack took place early last year, it would be difficult to obtain a result better illustrating

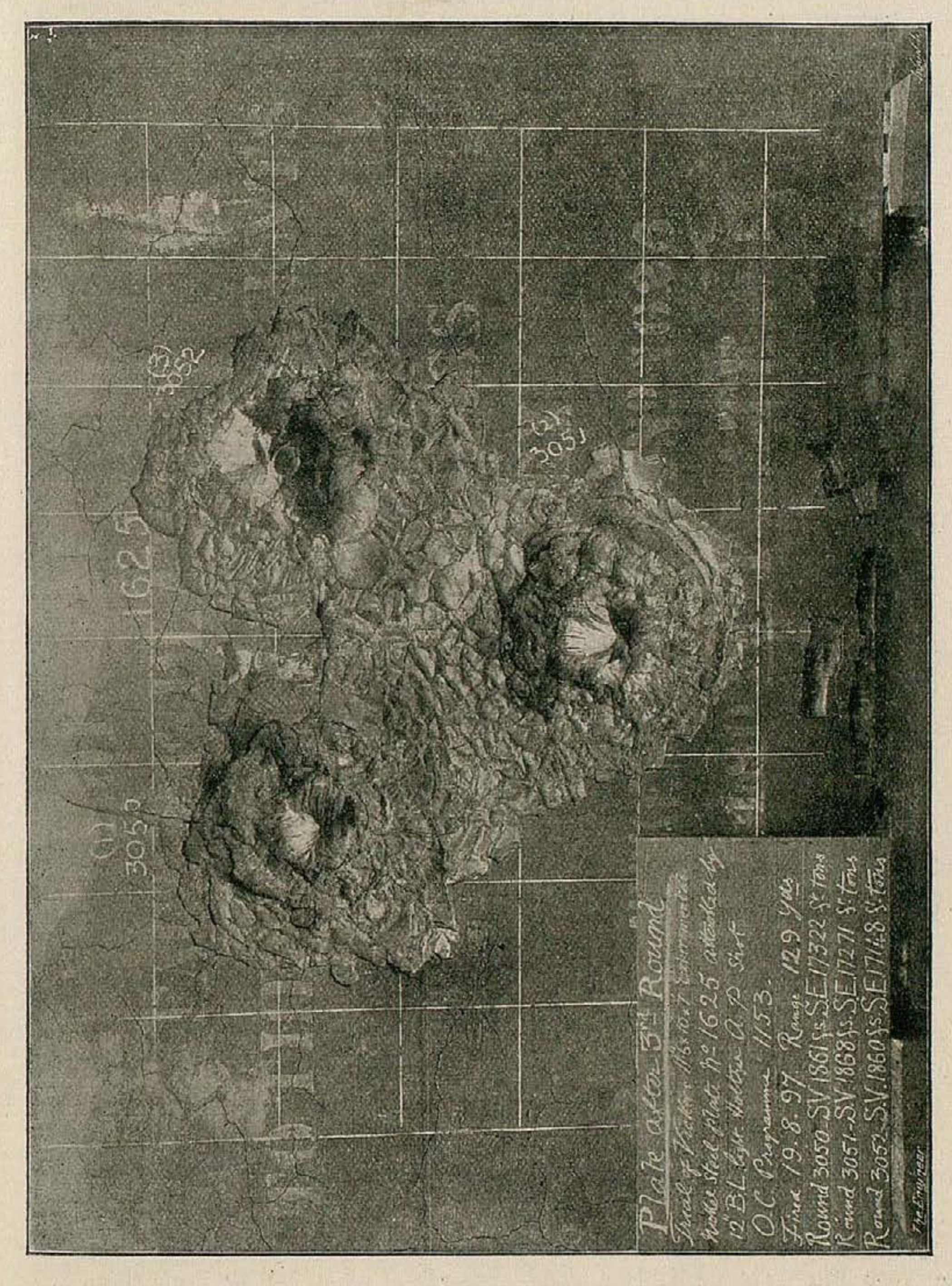


Fig. 3.—Vickers' $11\frac{11}{16}$-in. Plate.

the completeness with which the Government requirements have been met.

In connection with this proof of the shields of our secondary Thick plate.

armaments may be given a test-plate of thick armour, which it is hoped may eventually represent regular supply.

Fig. 3 shows a Vickers plate, 10 ft. × 7 ft. × 11$\frac{11}{16}$ in., which has borne the attack of three Holtzer 12-in. projectiles of 721½, 714, and 715 lbs. weight, with striking velocities of 1860, 1868, and 1860 ft.-secs. respectively, implying a perforation of about 23·5 inches of iron or 2·05 times the thickness of the actual plate, and a striking energy per ton of plate of about 1169 ft.-tons. This is a magnificent result, for the plate has completely defeated an attack which is severe



FIG. 4.—ARMOUR PLATE FOR THE KEARSAGE.

as to perforation, and much more so as to fracture, seeing that the shock is not only very great, but delivered by a projectile whose diameter is one-seventh the breadth of the plate, so that the wedging effect of three such projectiles must indeed test its toughness. As would be guessed, these plates represent the outcome of the Krupp and other processes as worked out by Vickers.

U.S. armour. Kearsage plate.

The following test of armour for the Kearsage in the United States (see Fig. 4) is probably a good example of what can be done there. The plate was a Bethlehem one, 10 in. thick, and was attacked in the spring of 1897 by 8-in. Holtzer shot weighing 250 lbs., with striking velocities of 1474, 1754, and 2079 ft.-secs., the striking energy of the

last round being 7494 ft.-tons. These velocities imply perforations through iron of 12, 15·6 and 20·1 in., the last being 2·01 times the thickness of the plate. The penetrations effected were estimated at 2, 4, and 10 in. The plate is apparently excellent, but the severity of the trial cannot be compared with that of the Vickers $11\frac{1}{16}$-in. plate, because although the perforation test by the last round is nearly the same, the two first, which, it appears, would have secured the acceptance of the plate, were much lighter blows, whereas Vickers plate received three similarly heavy blows. The American 10-in. plate was attacked by an 8-in. shot, and the Vickers $11\text{-}\frac{1}{16}$-in. by a 12-in. shot. Without being able to give the exact weight of the plate, it may be seen from the scale in the figure that its dimensions were about 12 ft. × 6 ft. 6 in., so its weight would be about 14·3 tons

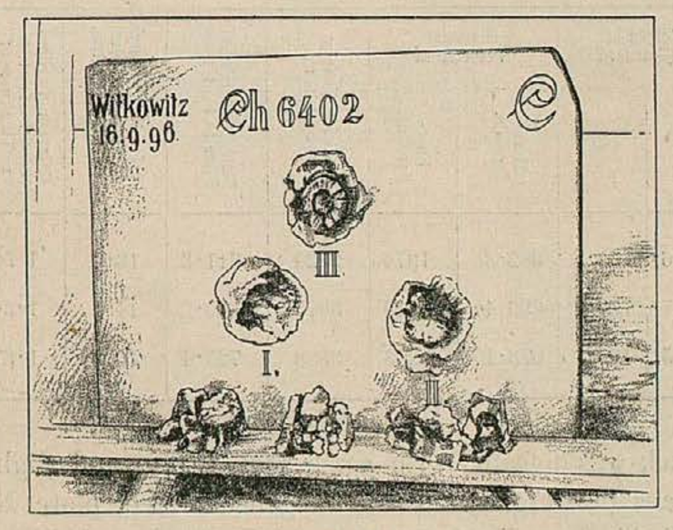


Fig. 5.

and the shock per ton of the heaviest blow only about 524 ft.-tons as compared with 1169 ft.-tons in the British plate. Then, again, the penetration actually achieved was much greater in the American plate. And lastly, the scale of operations is smaller, which favours the plate generally. Altogether, remarkable as the achievements of U.S. armour have been, there has been nothing yet shown in the way of thick armour to compare with the thick plates made in England and Germany on the Krupp process. The latter are test plates, not plates taken on supply, but making all allowance for this, the advance in resisting power is very great.

Witkowitz homogeneous steel armour.

Attention was called by an article in the *Mittheilungen aus dem Gebiete des Seewesens, No. II.*, 1897, to the behaviour of a Witkowitz homogeneous steel plate, and also Harveyed Witkowitz armour. The principal interest attaches to the former because a Witkowitz

plate of this nature was preferred to all others with hardened faces in a competition at Pola in 1893, and but little has been known generally as to the development and powers of this special make of armour. Two plates were attacked, one Harveyed and one of homogeneous nickel steel, in September, 1896. The early date detracts from the value of the trial, but the advocacy of the armour as compared with that of Krupp's on the strength of it, is comparatively recent, and it is the best comparison of the best homogeneous armour available at the present time, so that a few words on it seem to be desirable. The Harveyed plate, No. 6402, was 6·07 ft. × 4·84 ft. × 8·66 in., and probably weighed 4·66 tons. The attack is shown in the following table:—

Attack of Plate No. 6402.

Round.	Weight of Projectile in		Striking Velocity in		Striking Energy in Foot-Tons.	Energy per Ton of Plate in Foot-Tons.	Perforation through Iron by Tresidder Formula in Inches.	Relation of Calculated Perforation to Thickness of Plate.	Depth of Indent in Inches.
	Kg.	lbs.	Metre-Seconds.	Foot-Seconds.					
I.	45·6	100·5	602·3	1976	2720	611·6	13·8	1·59	3·6
II.	45·7	100·8	639·4	2048	3075	660·3	14·4	1·66	3·9
III.	45·5	100·3	673·15	2208	3388	727·4	16·2	1·87	2·0

This attack was defeated with some face scaling and slight bulges but no cracks (see Fig. 5). The homogeneous steel plate, No. 6559, measured 5·64 ft. × 5·64 ft. × 8·66 in., and probably weighed about 5 tons. Its attack is shown in the following table:—

Attack of Plate No. 6559.

No. of Round.	Weight of Projectile in		Striking Velocity in		Striking Energy in Foot-Tons.	Energy per Ton of Plate in Foot-Tons.	Perforation through Iron by Tresidder Formula in Inches.	Relation of Calculated Perforation to Thickness of Plate.	Depth of Indent in Inches.
	Kg.	lbs.	Metre-Seconds.	Foot-Seconds.					
I.	45·5	100·3	608·4	1996	2771	549·1	14·0	1·62	4·9
II.	45·7	100·8	638·9	2096	3070	608·2	15·0	1·78	5·3
III.	45·5	100·3	677·3	2222	3434	680·5	16·4	1·89	4·3
IV.	45·55	100·4	677·3	2222	3438	681·3	16·4	1·89	5·3

The first two rounds produced no bulges or cracks. The third struck nearer to the second than was intended, and horizontal and vertical through cracks were made to the plate edge, apparently starting from round II. (see Fig. 6). A fourth round further developed the cracks, but no bulges were made (see Fig. 7).

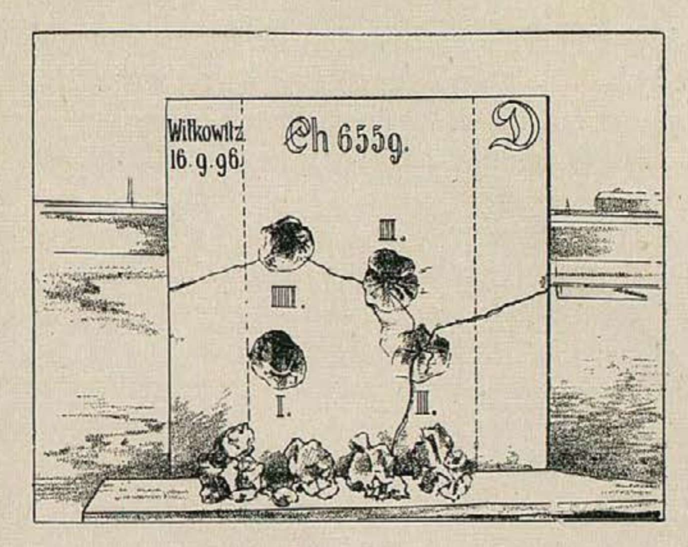


Fig. 6

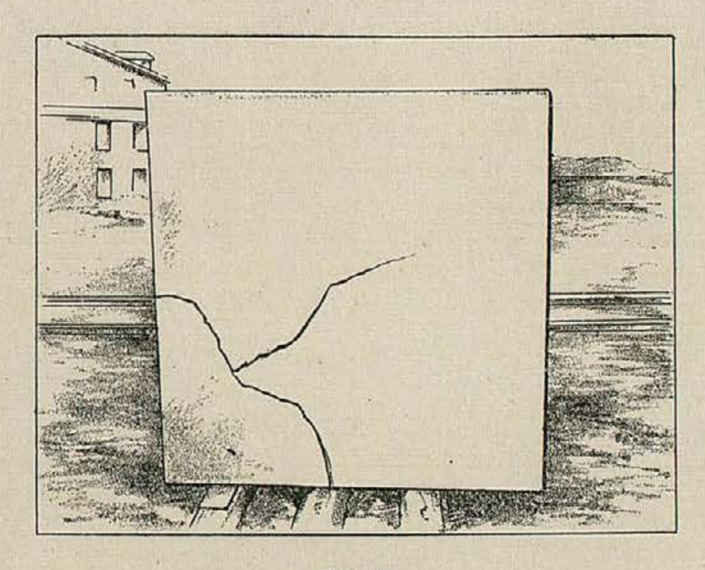


Fig. 7.

The plates are good, but the attack is not severe. The gun employed was only a 15-c.m. (5·9-in.) piece, which is small for a plate 8·66 in. thick. The homogeneous plate had a great deal of bone and stiff resistance in it, but judging from the way the cracks appear to start from the second point of impact, the metal was becoming strained and disintegrated at an early stage, and British

plates very shortly after this date were called upon to bear a much more severe strain for acceptance. In short, this trial is mainly valuable as showing that Messrs. Witkowitz, in spite of earlier

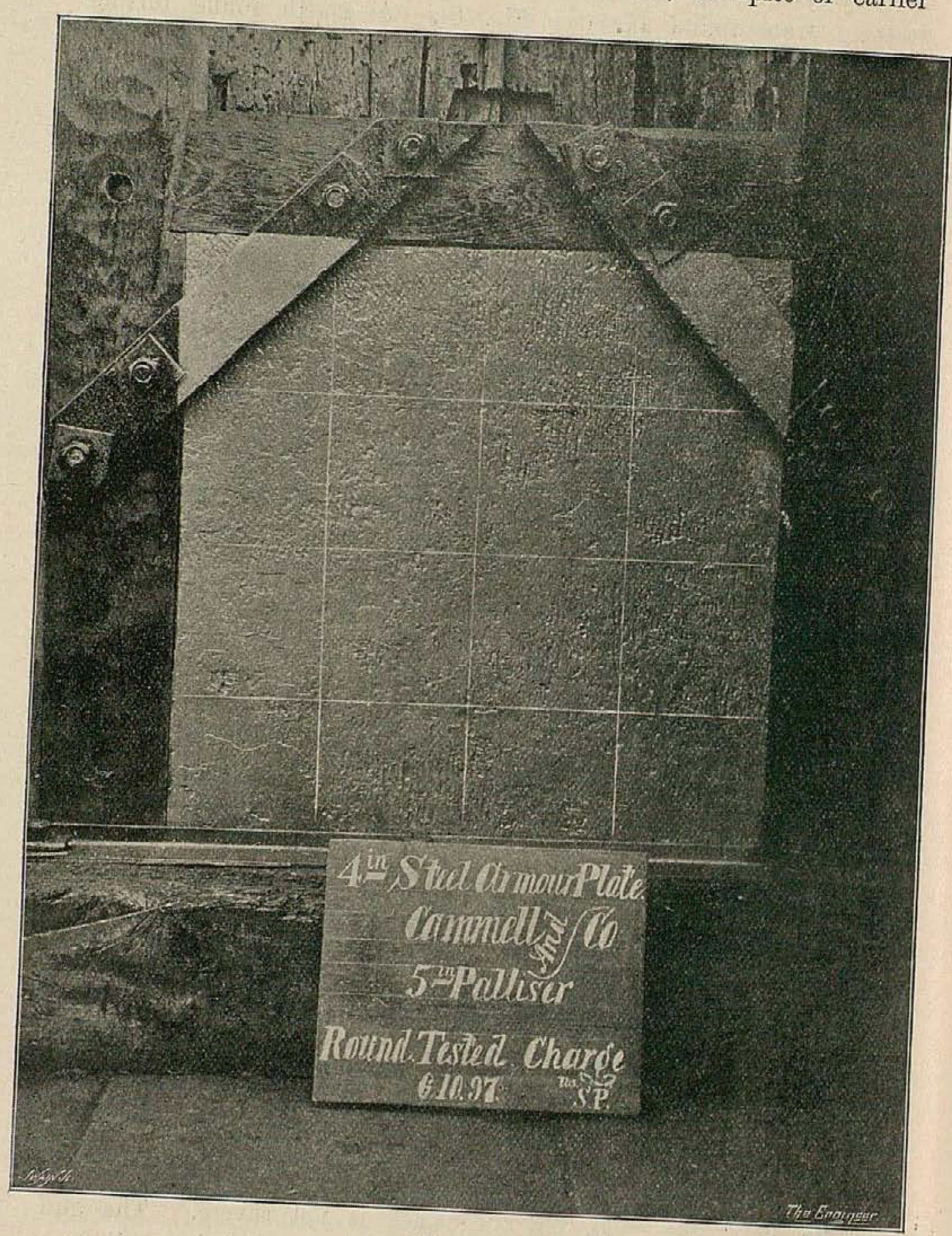


Fig. 8.

successes, cannot make homogeneous plates to compare well with their own Harveyed plates of the same date, and such plates admit of no comparison with the hard-faced plates of Krupp or other makers.

Fig. 8 herewith shows a Cammell 4-in. plate, 4 ft. × 4 ft., of about one ton weight, after being subjected to the service test on supply—that is, an attack by three Palliser 5-in. projectiles, each weighing 50 lbs., with striking velocities of 1406, 1750, and 1750 ft.-secs. The calculated perforation of each of the last two rounds is 8·8 in. of iron, and the shock per ton about 905·3 ft.-tons. The shot are, on the one hand, brittle, but, on the other, of calibre exceeding the thickness of the plate. On the whole the test is much less severe than that to which 6-in. plates are subjected, and it may be seen that the plate, which is apparently a very good one, is scarcely bruised by it.

British test for 4-in. plates. Cammell 4-in. plate.

In July Messrs. Vickers had a most successful trial of a 4-in. special nickel plate on the Nettle. The test and the defeat of the projectiles was the same, and the results nearly the same, as shown above in the case of the Cammell plate.

Vickers plate.

Messrs. Brown made an important trial as to the behaviour of a rough worked face and the effect of "lap," or fold, on a face struck by shot. A 6-in. plate was machined on one face and divided, one-half subsequently having the machined face treated, and the other the rough face, across which was a lap. Both resisted the usual attack of five 6-in. projectiles, striking with a velocity of 1960 ft.-secs., without serious cracking. It appeared, however, that one shot, striking exactly on the lap, got more nearly through than any of the others on either plate, including one striking a spot one inch from the lap; consequently this trial seems to indicate that machining is waste of work, and that a lap produces no effect unless the shot strikes exactly on it.

Messrs. Brown's experiment.

Excellent shot have been supplied by Messrs. Hadfield during the year. Two 6-in. projectiles with caps were fired in the summer at a 6-in. Harveyed plate, at Shoeburyness, and passed entirely through, though broken. Another 6-in. projectile passed unbroken through a 9-in. steel, water-hardened (but not Harveyed) plate. The Royal Laboratory have continued to make excellent A.P. projectiles.

Hadfield and Royal Laboratory projectiles.

Sir W. Armstrong & Co. have experienced some delay in the development of their Wheeler-Sterling projectiles owing to the great strike of last year. Previous to that a shell with a capacity of 4·2 lbs. of powder fired in comparison with a Holtzer shot was reported as doing quite as well as the latter by an officer who was not acquainted with the fact of the former being a shell. The great importance of armour-piercing shells of this calibre has been already pointed out.

The following notes with regard to the acceptance of projectiles in the United States deserve notice:—

U.S. tests of armour-piercing projectiles.

The makers of armour-piercing projectiles naturally are left free to follow any course of manufacture they think gives the best results, but the Government stipulates for full information in chemical analysis and as to physical tests, although exceptions may be made in the case of some secret process, when acceptance depends entirely on ballistic tests.

The Government furnish copper bands and gas checks. Armour-piercing projectiles are specified to be of forged and hardened steel, annealed at least 1200° Fah. after forging. Inspectors follow the projectile through each stage of manufacture. Before acceptance for ballistic trial, projectiles are tested for "initial strains bordering on rupture," by being brought to 40° Fah., plunged into water at from 180° to 212° Fah., and then again at 40° Fah. The interior of the projectile is also subjected to a hydraulic pressure of 500 lbs. to the square inch, and the development of holes, cracks, or unsoundness causes rejection.

U.S. ballistic tests for A.P. projectiles.

For the ballistic test of armour-piercing shot, two projectiles are fired normally at 1500 ft.-secs. velocity at a steel plate whose thickness is one and one-eighth times the calibre of the shot. If two out of three shots pass through plate and wood backing, without material cracks or deformation, the lot is accepted. The Government reserve the right to make the following alternative test, namely, that two out of three shots shall pass through a hardened-faced plate one calibre thick, either whole or in fragments; the striking velocity to be about 1900 ft.-secs. Armour-piercing shell are fired against a nickel-steel, oil-tempered and annealed armour plate 4½ in. thick for 8-in., 5¾ in. for 10-in., and 7 in. for 12-in. shells. With a striking velocity of about 900 ft.-secs., two out of three shells must pass through without being broken or materially deformed.

Spontaneous shell explosion in store.

On November 29th, 1897, three 4-in. armour-piercing shells in store in Devonport were found to have exploded, but with no great violence. They had been stored, filled and fuzed, as shown in Fig. 9 herewith. The weakness of the explosion points rather to the ignition of powder in a shell which is already split open than to the bursting action of powder. So far as can be learned, the fuze, which is a remarkably safe one, was not in fault. To fire its detonator, it is necessary first to force home the pressure plate in the base of the fuze, holding the end of the central spindle, and by this means to free its front end from a heavy collar carrying a centrifugal bolt; next, rotation is needed to cause the heavy collar to clear the needle pellet and leave it free to compress a small spring in front and drive its needle into the detonating patch, which fires charge and shell; but this can only be done by a violent check given to the shell while

it is in rotation, such as occurs in striking at the end of its flight, but cannot be otherwise set up by any conceivable accident. It seems probable then that the shells were broken by molecular action such as occasionally has been known to occur, and that sufficient heat was generated to fire the powder. It is necessary

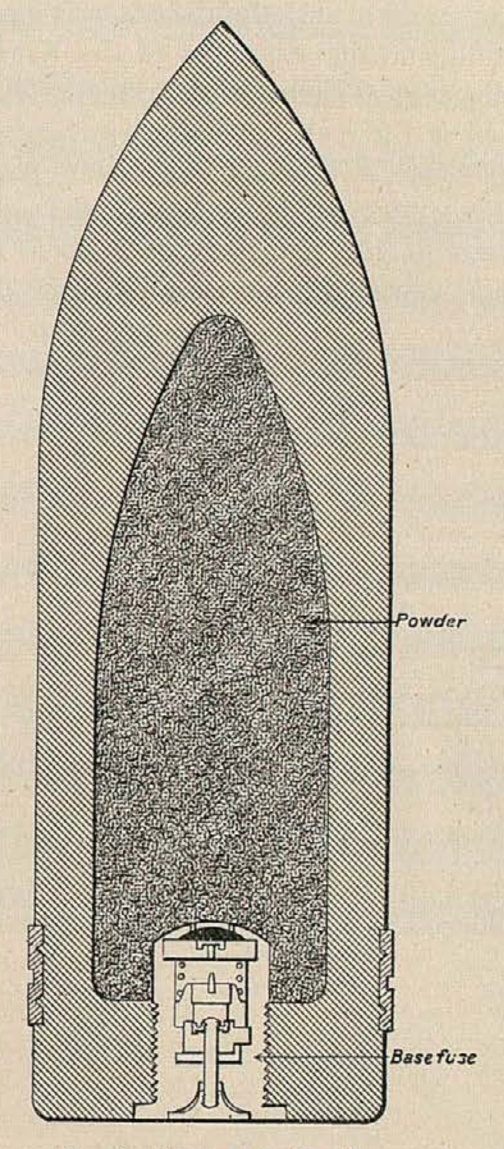


FIG 9.—SECTION OF 4-IN. SHELL.

that this should be prevented. The test for initial strain above described might possibly obviate the evil.

M. L. E. Bertin, Director of Naval Construction in France, read an able Paper before the International Congress of Naval Architects and Engineers in July last, analysing the effect of shot on armour, using chiefly the data supplied by Mr. Charles Ellis's paper of 1894. M. Bertin is satisfied that the Harvey process confers great advan- M. Bertin's Paper on hardened plates and projectiles.

tages on the plate, but does not think that thick plates benefit to the same extent as thin ones. The results of experiments which have come since his Paper was read, appear to support his view. In the United States a striking velocity of 1900 ft.-secs. appears generally to carry a 12-in. shot through a 12-in. Harveyed plate; a first-class 6-in. plate would entirely defeat a 6-in. shot with this velocity. In certain notable examples of the Krupp process, thick plates give results nearly rivalling thin armour proportionally, but as yet they have been very few, and undoubtedly are produced with much greater difficulty than is the case with thin plates. M. Bertin analysed the effects produced by a shot in the act of penetration, showing why caps in his judgment gave good results, although pointing out that occasionally an uncapped shot produced as good an effect.

BRITISH M. L. GUNS.

PERFORATIONS

	RACKING-POWER MUZZLE-ENERGY FOOT-TONS.
7 IN. IV. 7 TONS.	1341
8 IN. III. 9 TONS.	2398
9 IN. V. 12 TONS	3681
10 IN. II. 18 TONS	5408
11 IN. II. 25 TONS	7028
12 IN. II. 25 TONS	7190
12·5 IN. II. 36 TONS	14070
16 IN. I. 80 TONS	27960
17·72 IN. I. 100 TONS	33220

THICKNESS OF FRONT PLATE IN INCHES STEEL	EQUIVALENT OF STEEL & BACKING IN WROUGHT IRON	FRENCH	ITALIAN	GERMAN	RUSSIAN
21·5	28	A BAUDIN	DUILIO		
19·8	25·7	CAIMAN	ITALIA		
18·1	23·6		DORIA		
17·8	23·2	HOCHE, FURIEUX, CH. MARTEL, BOUVINES			
17·4	22·5	A DUPERRÉ			
15·8	20·7	BRENNUS	SARDINIA	BADEN, BRANDEN-BURG	CATHER-INE. II.
14·2	18·8	TONNANT			ALEX-ANDER II.
12·6	16·7			OLDENBURG	
12·0	16·0	COURBET			
11·2	15	REDOUT-ABLE			
10·4	14	FULMI-NANT			A. NACHI-MOFF
8	11	BAYARD, ACHERON		DEUTSCH-LAND	
7	9·8				
6·8	9·5	BELIER, FRIEDLAND			
6·2	8·7				

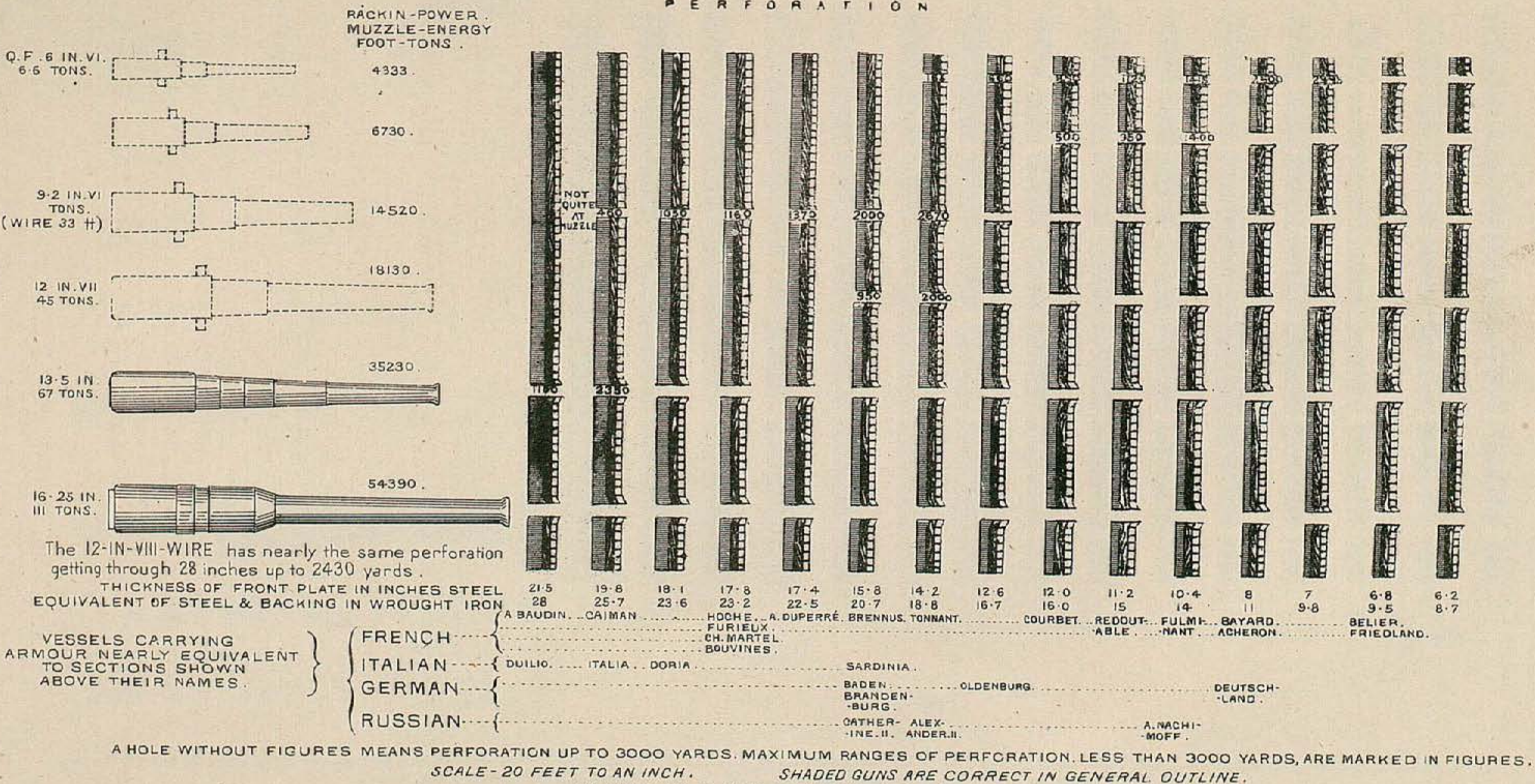
VESSELS CARRYING ARMOUR NEARLY EQUIVALENT TO SECTIONS SHOWN ABOVE THEIR NAMES.

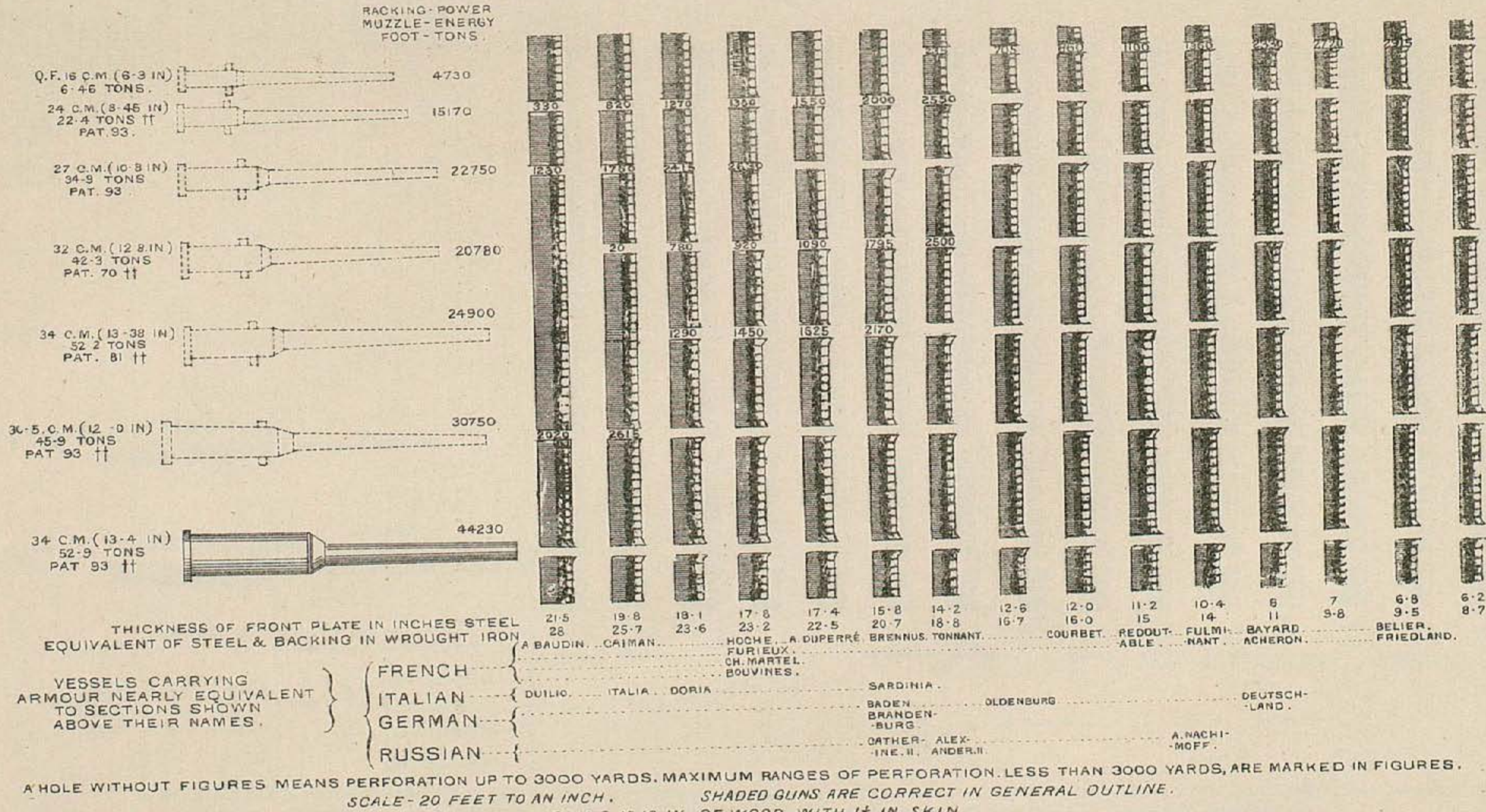
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION, LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. *SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.*

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

PL. II.


BRITISH B.L. GUNS.
PERFORATION
RACKIN-POWER. MUZZLE-ENERGY FOOT-TONS.
† Q.F. 6 IN. VI. 6.6 TONS. 4333.
6730.
9·2 IN. VI TONS. (WIRE 33 ††) 14520.
12 IN. VII 45 TONS. 18130.
13·5 IN. 67 TONS. 35230.
16·25 IN. III TONS. 54390.
NOT QUITE AT MUZZLE
The 12-IN-VIII-WIRE has nearly the same perforation getting through 28 inches up to 2430 yards.
THICKNESS OF FRONT PLATE IN INCHES STEEL: 21·5, 19·8, 18·1, 17·8, 17·4, 15·8, 14·2, 12·6, 12·0, 11·2, 10·4, 8, 7, 6·8, 6·2
EQUIVALENT OF STEEL & BACKING IN WROUGHT IRON: 28, 25·7, 23·6, 23·2, 22·5, 20·7, 18·8, 16·7, 16·0, 15, 14, 11, 9·8, 9·5, 8·7
VESSELS CARRYING ARMOUR NEARLY EQUIVALENT TO SECTIONS SHOWN ABOVE THEIR NAMES.
FRENCH: A. BAUDIN. CAIMAN. HOCHE. FURIEUX. CH. MARTEL. BOUVINES. A. DUPERRÉ. BRENNUS. TONNANT. COURBET. REDOUTABLE. FULMINANT. BAYARD. ACHERON. BELIER. FRIEDLAND.
ITALIAN: DUILIO. ITALIA. DORIA. SARDINIA.
GERMAN: BADEN. BRANDENBURG. OLDENBURG. DEUTSCHLAND.
RUSSIAN: CATHERINE. II. ALEXANDER. II. A. NACHIMOFF.
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION, LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.
SCALE - 20 FEET TO AN INCH. SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.
ALL BACKING IS 18 IN. OF WOOD WITH 1+ IN SKIN.
NOTE THE 29 TON 10 IN. GUN PERFORATES THE 18·8 IRON (TONNANT) SHIELD AT 1800 YARDS AND ALL THINNER SHIELDS AT ALL RANGES.
† THIS GUN IS TAKEN FROM ELSWICK Q.F. GUN TABLE. †† PERFORATIONS CALCULATED BY TRESIDDERS-FORMULA.
** VICKERS 6 IN. Q.F. GUN WHEN FIRED AT PORTSMOUTH HAD A MUZZLE ENERGY OF 5373 FT TONS IMPLYING A PERFORATION OF 22·7 INCHES OF IRON.


FRENCH GUNS.
PERFORATIONS
RACKING-POWER MUZZLE-ENERGY FOOT-TONS.
Q.F. 16 C.M. (6·3 IN) 6·46 TONS. 4730
24 C.M. (8·45 IN) 22·4 TONS †† PAT. 93. 15170
27 C.M. (10·8 IN) 34·9 TONS PAT. 93 22750
32 C.M. (12·8 IN) 42·3 TONS PAT. 70 †† 20780
34 C.M. (13·38 IN) 52·2 TONS PAT. 81 †† 24900
30·5 C.M. (12·0 IN) 45·9 TONS PAT 93 †† 30750
34 C.M. (13·4 IN) 52·9 TONS PAT 93 †† 44230
330 1230 2020
820 1755 20 2615
1270 2415 780 1290
1300 2630 920 1450
1550 1090 1625
2000 1795 2170
2550 2500
705
1150
1100
1360
2520
2720
2915
THICKNESS OF FRONT PLATE IN INCHES STEEL
EQUIVALENT OF STEEL & BACKING IN WROUGHT IRON
21·5 28
19·8 25·7
18·1 23·6
17·8 23·2
17·4 22·5
15·8 20·7
14·2 18·8
12·6 16·7
12·0 16·0
11·2 15
10·4 14
8 11
7 9·8
6·8 9·5
6·2 8·7
VESSELS CARRYING ARMOUR NEARLY EQUIVALENT TO SECTIONS SHOWN ABOVE THEIR NAMES.
FRENCH
A. BAUDIN. CAIMAN. HOCHE. FURIEUX. CH. MARTEL. BOUVINES. A. DUPERRÉ. BRENNUS. TONNANT. COURBET. REDOUT-ABLE. FULMI-NANT. BAYARD. ACHERON. BELIER. FRIEDLAND.
ITALIAN
DUILIO. ITALIA. DORIA. SARDINIA.
GERMAN
BADEN. BRANDEN-BURG. OLDENBURG. DEUTSCH-LAND.
RUSSIAN
CATHER-INE. II. ALEX-ANDER. II. A. NACHI-MOFF.
A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION. LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.
SCALE - 20 FEET TO AN INCH.
SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.
ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.
†† PERFORATIONS CALCULATED BY TRESIDDERS FOMULA.

PL. IV.

GERMAN GUNS

PERFORATION

Gun	Racking-power muzzle-energy foot-tons
† Q.F. 15 C.M. (5·9 IN) 4·35 TONS.	3153.
† Q.F. 16 C.M. (6·3 IN) 5·41 TONS.	3895.
24 C.M. (9·45 IN) 18·7 TONS.	9024.
26 C.M. (10·3 IN) 21·7 TONS.	1211.
30·3 C.M. (12 IN) 35·4 TONS.	14780.
30·5 C.M. (12·10 IN) 61·5 TONS.	34700.
40 C.M. (15·75 IN) 119 TONS.	52500.

NEARLY MUZZLE

Thickness of front plate in inches steel	Equivalent of steel & backing in wrought iron	French	Italian	German	Russian
21·5	28	A BAUDIN.	DUILIO.		
19·8	25·7	CAIMAN.	ITALIA.		
18·1	23·6		DORIA.		
17·8	23·2	HOCHE. FURIEUX. CH. MARTEL. BOUVINES.			
17·4	22·5	A. DUPERRÉ.			
15·8	20·7	BRENNUS.	SARDINIA.	BADEN. BRANDENBURG.	CATHERINE. II.
14·2	18·8	TONNANT.			ALEXANDER. II.
12·6	16·7			OLDENBURG.	
12·0	16·0	COURBET.			
11·2	15	REDOUTABLE.			A. NACHIMOFF.
10·4	14	FULMINANT.			
8	11	BAYARD. ACHERON.		DEUTSCHLAND.	
7	9·8				
6·8	9·5	BELIER. FRIEDLAND.			
6·2	8·7				

VESSELS CARRYING ARMOUR NEARLY EQUIVALENT TO SECTIONS SHOWN ABOVE THEIR NAMES.

A HOLE WITHOUT FIGURES MEANS PERFORATION UP TO 3000 YARDS. MAXIMUM RANGES OF PERFORATION, LESS THAN 3000 YARDS, ARE MARKED IN FIGURES.

SCALE - 20 FEET TO AN INCH. *SHADED GUNS ARE CORRECT IN GENERAL OUTLINE.*

ALL BACKING IS 18 IN. OF WOOD WITH 1½ IN SKIN.

† *TAKEN FROM KRUPP Q.F. GUN TABLE.*

‡ *TAKEN FROM KRUPP ORDNANCE AT CHICAGO.*

CHAPTER II.

ORDNANCE.

THE progress made in Ordnance during the year consists almost entirely in the development and application of quick-fire. If our battles are likely to be fought mainly by our heavy Q.-F. guns, it is not surprising that every effort should be made both to increase their power and also to find room for them in vessels which did not originally carry them. Thus in England the greatly increased muzzle-energy obtained by the new Vickers 6-in. Q.-F. gun at Portsmouth possesses an importance which is, in a measure, appreciated by all, though perhaps fully appreciated by few. This, then, is an example of development of power. A new 12-in. Vickers gun and a 9·2 Gun Factory naval gun are in progress, as well as field Q.-F. guns. Notable examples of the increased application of Q.-F. guns in the armament of ships were already to be found in the previous year in the case of our Argonaut class of cruisers of 11,000 tons displacement, carrying sixteen 6-in. Q.-F. guns as compared with the Powerful of 14,200 tons, carrying two 9·2-in. ordinary guns and twelve 6-in. Q.-F. pieces. It will be found on working out that the new cruisers possess an increased energy of fire, compared with their predecessors, which may amount to 20 per cent., but which, on even a considerably lower estimate, means a great increase of power in comparison to the displacement of the vessel.

The French have removed the central barbette heavy gun in some vessels, replacing it by a redoubt containing Q.-F. guns, as noticed hereafter, which constitutes an approach to our British plans dating as far back as the Admiral class. Germany and the United States have brought in Q.-F. guns of increased calibre and in increasing numbers. These are only illustrations of the general current of opinion.

The great importance of power in our heavy quick-fire pieces is obvious. Sufficient protection is afforded to the quick-fire batteries of many ships to defy the attack of anything less than 6-in. guns. For this reason, as once before pointed out, the New York, with her 4-in. pieces, would be at a terrible disadvantage in engaging any

Authorities.—The *Engineer* for plates and matter. The United Service Institution Proceedings, United States Notes on Naval Progress, the *Times*, Messrs. Vickers and Schneider Canet, also published information from official sources.

ship with guns shielded by 6 in. of steel—for example, the Garibaldi, with 6 in. on the belt and battery of 6-in. Q.-F. guns. With this armament the New York is still shown, but that the United States Government would send her on any serious service so equipped is not to be believed. It may, no doubt, be urged that, in the great majority of cases, even battleships carry much less protection than 6 in. for their Q.-F. guns; but then, where a Q.-F. 4-in. gun might get a shot through, a 6-in. armour-piercing shell might have gone, causing damage out of all proportion to the effect of a shot. The fact is that, for the attack of many existing ships, the best projectile is not the one which has the greatest penetration, but the one which will effect most injury after passing through medium or thin armour. This may be a shell, but certainly one delivered by a powerful Q.-F. gun, and energy remains an important factor. Elswick has long advocated and supplied very powerful Q.-F. guns. The Esmeralda, launched in 1896, carried two 8-in. Q.-F. guns, besides her sixteen 6-in. Q.-F. pieces. This year, the introduction of the Vickers 6-in. gun is intended to give us a broadside piece of greatly increased energy, which would generally be capable of attacking an enemy's secondary batteries with armour-piercing or even common shells, and, even in the case of most 6-in. shields, might easily get shot through. In short, the great point to secure is superiority in attack and defence for the Q.-F. gun. Happily, this is possessed in a high degree in the designs of Sir William White, where each 6-in. gun is in many cases, both in first-class cruiser and battleship, mounted in a 6-in. casemate.

Alterations in armament of Amiral Baudin.

To come to the points above enumerated in more detail, the central gun position of the Amiral Baudin, or other vessels carrying a 37-cm. (14·5-in.) gun, has been replaced by a small armoured redoubt containing four 16-cm. (6·47-in.) Q.-F. guns. The substitution of quick-fire pieces for one of the three primary guns of a battleship is a notable recognition of the value of quick-fire. The muzzle energy of the 37-cm. gun is 33,210 ft.-tons, and that of the 16-cm. Q.-F. gun, 4,730 ft.-tons. Seven rounds of the latter, therefore, nearly equal one of the heavy gun. Generally only half the Q.-F. guns could be put in action, so that each piece would have to fire three and a half rounds to give a result equal to that of one round of the heavy gun. In other words, the two Q.-F. pieces between them must get off seven rounds for one of the heavy gun. The old gun probably was not capable of firing very rapidly, but doubtless might have been replaced by one firing a round in a minute and a half. The two quick-fire pieces might deliver about fourteen rounds in this time, so that the gain in total energy would

thus be two to one, compared with the best heavy gun, under the most favourable circumstances. Practically, as the guns generally all enter into action loaded, and as the quick-fire rate is difficult to maintain, the advantage would be less than this, but still very considerable.

Extension of quick-fire in United States.

In the United States, the manufacture of 6-in. Q.-F. guns with the Fletcher breech mechanism progresses, and a system of conversion of existing 6-in. pieces into quick-firers has been approved and applied, and all lighter guns carried on United States vessels are now to be quick-firers.

Adoption of heavy Q.-F. guns in German Fleet.

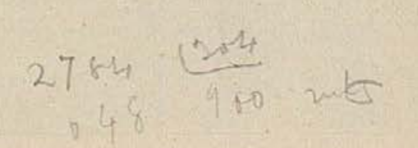
For the German navy, it has long been decided that guns up to and including 24 cm. (9·45-in.) calibre shall be quick-fire pieces. The Krupp table of Q.-F. guns in last year's *Annual*, indeed, contained these pieces. The term "quick-fire" applies in a more limited sense as the calibre and weight of ammunition increases. In a certain measure, the British 12-in. gun has long been a quick-firer. The substantial fact is the recognition of the advantage of increased rate in discharge in greater or less degree, and the decision to make considerable sacrifice to obtain it.

Vickers 6-in. Q.-F. gun.

The Vickers 6-in. Q.-F. gun, recently introduced into the service, is shown in Fig. 1. It was first tried on board the Pincher gunboat at Portsmouth on October 21st last, subsequently at Shoeburyness, and adopted for the service in January last. Its length of bore is 45 calibres, and its weight 7 tons 8 cwt. It is of wire construction, and proportioned to bear the prolonged pressure of its large firing charge of 25 lb. of cordite during the passage of the shot up the bore. It will be seen that the mounting carries a small curved shield of special nickel-treated steel, which has been proved to possess high resisting power, although the steel is able to be brought to the abrupt curve needed for the shield.

Features of.

There are three leading features in the gun as put forward and tried:—(1) great energy; (2) special breech action, giving ease and speed of working; (3) obturation sufficiently complete to enable the metal cartridge commonly used in quick-firing guns to be dispensed with. On the day of trial at Portsmouth a muzzle velocity was attained with a 100-lb. projectile of 2,784 ft.-secs., implying a muzzle energy of 5,373 ft.-tons, and a perforation of 22·7 in. of iron by Tresidder's formula. This, it need hardly be said, is extraordinary, the greatest perforation laid down in the service table for a 6-in. gun being 15·9 in. of iron. In stating this, it is desirable to point out that it is extremely difficult to maintain such a performance as the gun continues in use. Very rapid fire with very large charges of cordite involves an amount of wear that it is very difficult to resist.



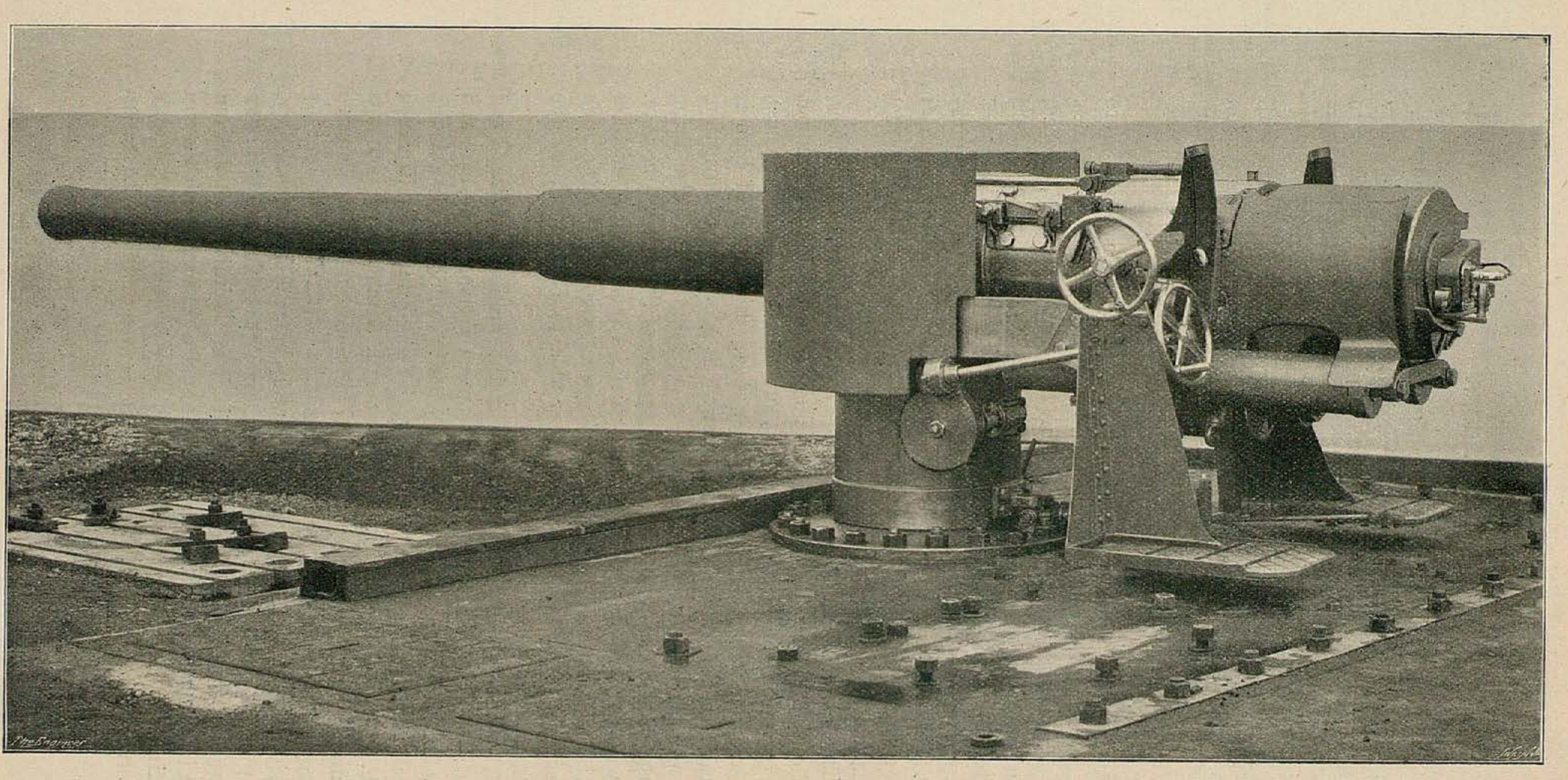


FIG. 1.—VICKERS' NEW 6-INCH QUICK-FIRE GUN.

Messrs. Vickers, however, have confidence in the means which they have adopted to this end.

To come to the second leading feature—that is, ease and speed of

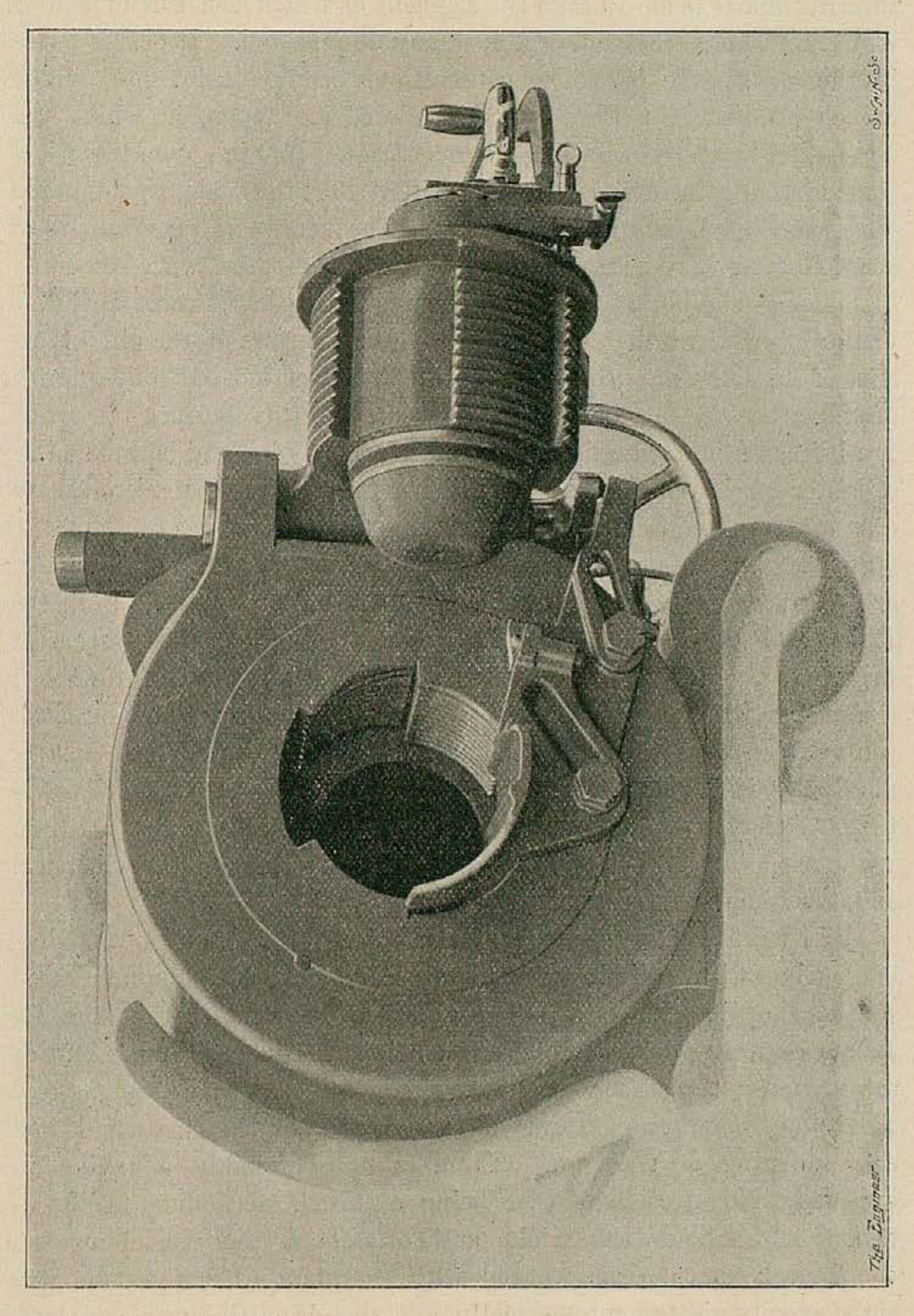


FIG. 2.—BREECH OF 6-INCH GUN.

working—Fig. 2 gives the breech end of the gun with the breech open. The screw and De Bange obturator are seen clearly, and some of the more important parts of the mechanism. The screw is made on a system embodying the Weling patent. For the interrupted thread

of the French system is substituted in the portions or segments differences in radius exceeding the height of the screw thread, which may consequently be continued throughout, except where a break or interruption is made to take the segment of which the thread stands highest. This succession of steps may be repeated. It occurs twice in the 6-in. We give also illustrations of the 12-in. gun, whose breech is shown in Figs. 3 and 4, closed and open, in which the succession of steps is repeated three times. In each case there is a considerable gain in the length of screw thread bearing, as compared with the French interrupted system. The screw and mechanism of the 12-in., as may be seen, are very light compared with the large diameter of the bore. This advantage is perhaps still more apparent in the 12-in. than the 6-in. In this three-quarters of the circumference of the screw are used for effective thread section, only one-quarter of the circumference being non-screwed. On this account the screw can be made lighter and shorter than in other types, and consequently a lighter carrier can be used, and the manipulation is rendered more easy and rapid. Further, the shortness of the screw admits of the gun itself being shortened at the breech, that is at the heaviest part, and great weight is saved which can be utilised elsewhere. Both the 12-in. and 6-in. mechanisms have practically the same system of firing gear. There is an automatic tube ejector which throws out the primer when the breech is opened. The tube can be placed in the vent either with the breech open or closed, and in the case of a missfire it is not necessary to open the breech to withdraw the tube. Safety gear exists, rendering it impossible to fire the gun without the breech being closed and locked, either on the electrical or percussion-firing system.

The third leading feature in the 6-in. Q.-F. gun is obturation, dispensing with the use of a metal cartridge. This is facilitated by the shortness of screw, so that it has been found that the De Bange obturator can be rendered efficient. The advantages of this are obvious; the doing away with the metal case saves weight and magazine room, and saving of weight facilitates the rapid and easy working of the gun. There is also probably a saving in expense. No ejection of case being required, mechanism is simplified. Throughout the trials at Portsmouth and Shoeburyness, the breech mechanism worked with complete ease, the tube was satisfactorily ejected automatically, and the obturation was complete. The heating of the metal was also watched, and considered to be well under the needed limit of temperature.

Trial at Shoeburyness.

The Shoeburyness trial took place on January 13th in the presence of the representatives of the War Office and Admiralty.

The object of this further trial was to test the accuracy of the gun after having fired upwards of 200 rounds, including the rounds fired at the proof of the gun; and also to submit the gun to a further test for rapidity, under conditions of service, using a 100-lb. shot, a cordite charge, and service primers. The trial commenced with a series of ten rounds, the result of which showed that the accuracy of the gun had not fallen off in consequence of the great amount of work already done by it. On the contrary, on two occasions the projectiles passed through the same hole in the target. Firing was then suspended, due to the weather becoming overcast, but in the afternoon it cleared, and the rapidity series was successfully completed. This series was conducted by a crew of seamen gunners specially sent by H.M.S. Excellent for the purpose. Thirty-six rounds were fired in four minutes forty-seven seconds, and this time included taking temperatures of the vent head, which operation was considered desirable owing to the very rapid rate of fire. This rate of fire gives practically one round per each eight seconds, or at the rate of 100 rounds in thirteen and one-third minutes, which, for practical considerations, allowing 100 seconds for cooling during the 100 rounds (this extra time would probably be necessary for the supply of ammunition on board ship), would give a rate of fire of 100 rounds in fifteen minutes.

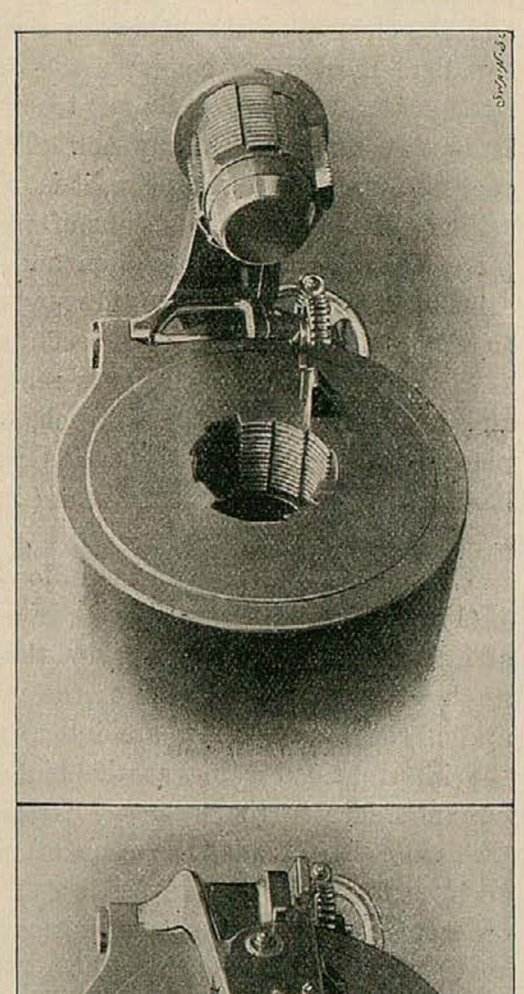


Fig. 4.

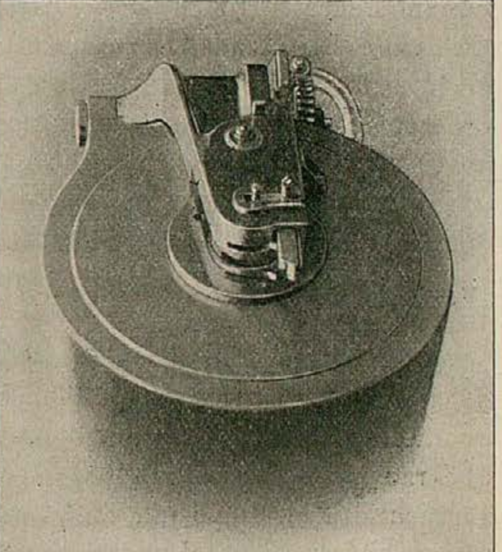


Fig. 3.

12-inch Gun, Breech Closed and Open.

Schneider-Canet Q.-F. breech mechanism.

The following description furnishes an example of the Schneider-Canet Q.-F. Breech Mechanism. It is characterised by the successive performance of the opening of the breech, the extraction of the case, and the closing of the breech by a single stroke of the lever. The complete mechanism comprehends only a small number of simple, strong pieces, which can be put together or taken asunder easily by hand without the use of any tool. The striker is automatically set or cocked. In case of a missfire, it is only necessary to draw back the striker again by hand by means of the ring (see A, Fig. 9). All the pieces of this action are hidden and protected by the cover in the same figures. In order to fire by electricity it is only necessary to substitute for the striker A a contact piece, &c.

The movement of the lever is generally from left to right to open, and inversely to close the breech, but the hinge may be as well placed on the left, and the action reversed. Fig. 5 shows the left hand arrangement for the 75 mm. (2·95 in.), and Figs. 6 and 8 the right hand one.

The mechanism contains the following parts:—

(1) The breech screw (see D, Figs. 5, 6 and 8), which is held and supported by the cover by the screw thread, is of the same pitch as that of the breech of the gun. The threads of the breech and of the breech screw are interrupted, as shown in Figs. 5 and 6, the interruptions being at the highest and lowest quarters of the circumference in the former. A rotation through 90 deg. suffices to disengage the threads from each other, and the form of the parts is such as to render it unnecessary to draw the breech screw back in order to clear the breech; a single motion swings it out held in the cover, as shown in Figs. 5 and 6.

(2) The hinged cover is of bronze, and is threaded with a screw which holds and guides the breech screw. It contains also the seat of the rack and of the rack bolt (see Fig. 7) and of the trigger.

(3) The lever is in one piece with the axis bolt of the hinge (see E, Fig. 6). It carries the pin which moves the rack, which imparts rotation to the breech screw by means of the recess (F, Fig. 7) and the rack and pinion. It is worked by its vertical handle, which is automatically clamped in the cover as the breech closes, so as to prevent any accidental unscrewing of the breech screw.

(4) The rack, sliding in the cover (see C, Fig. 7), gears with the pinion teeth of the breech screw, and carries at its extremity a recess F into which the pin of the lever works.

(5) Extractor (G, Fig. 6), fork-shaped, is furnished with two branches which hold to the front of the rim of the case and dislodge

and eject it. It is actuated by means of a stud and arm connected with the axis bolt of the hinge.

(6) For firing by percussion, the striker (see H, Fig. 9) held in the centre of the breech block has two symmetrical helicoidal grooves which bear at the moment of opening on two similar grooves in the screw. The cocking spring is placed between the head of the striker and a spindle with flanges (see Fig. 8) which holds in the breech screw, and cannot participate in the movement of the striker. A key through the cover and striker prevents the latter from turning round, and permits the longitudinal movement

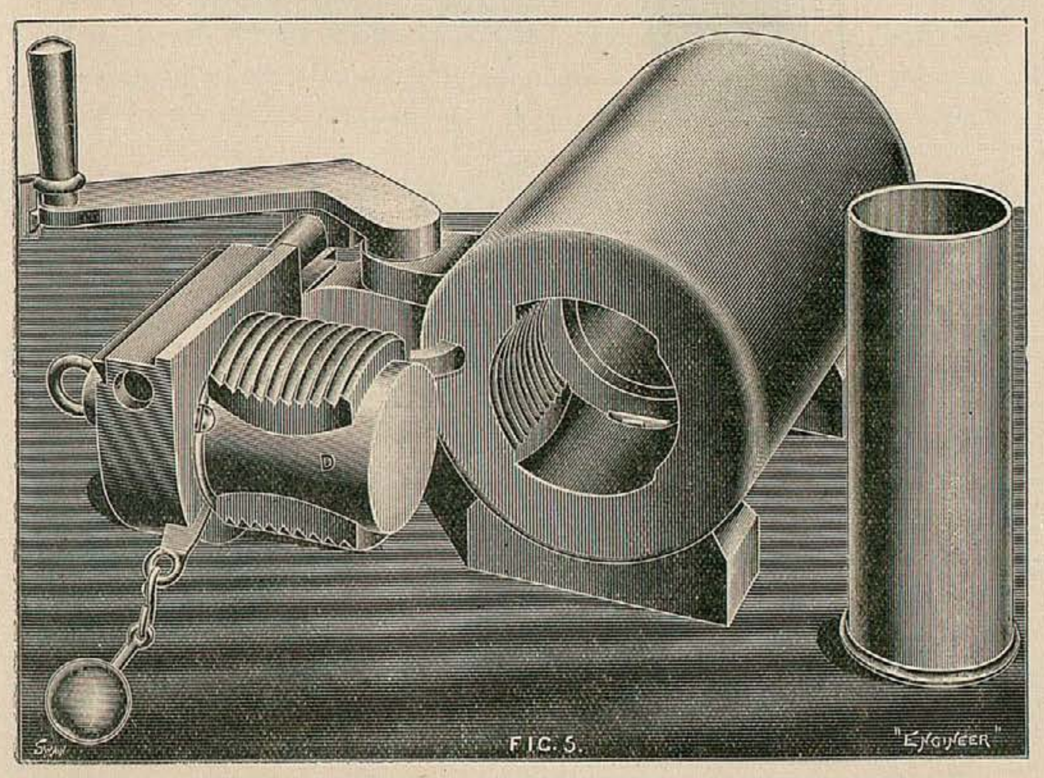


FIG. 5.—75-MM. GUN, BREECH OPEN.

set up by the reciprocal action of helicoidal grooves. The compression of the cocking spring thus results from the back movement of the striker.

(7) For firing by electricity, the striker is replaced by the insulated circuit and piece. The breech being closed, contact is made with the centre of the electric tube in the base of the cartridge. An insulated flexible conductor completes the connection with a contact spring on the cover, and when this latter rests against the end surface of the gun, the spring bears on the stem of a conjunctor fixed on the gun. This conjunctor has a spring check, and a spring contact maker with an ivory finger piece, which last is pressed at

2 C 2

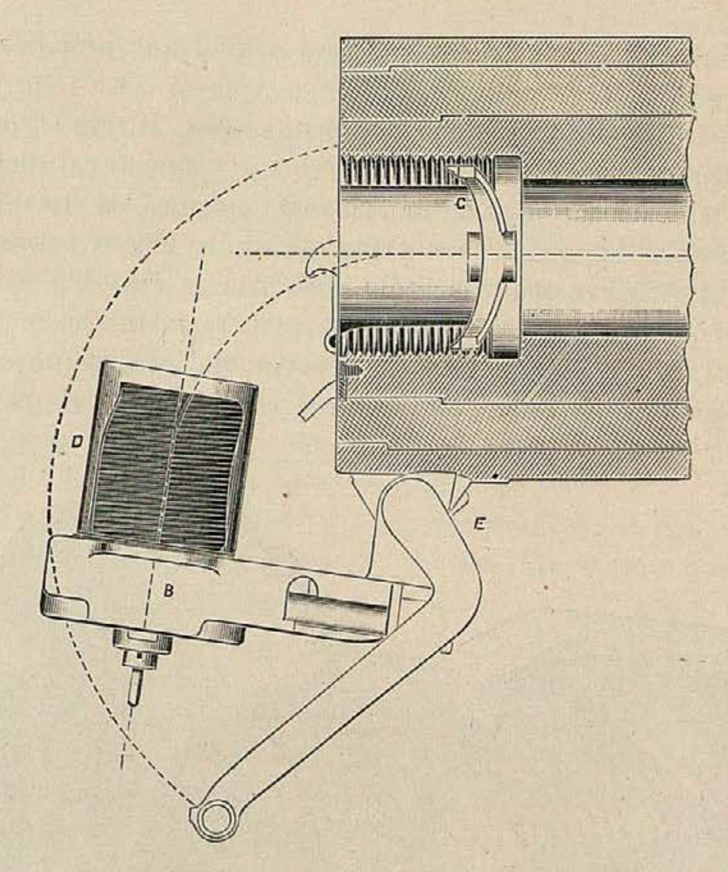
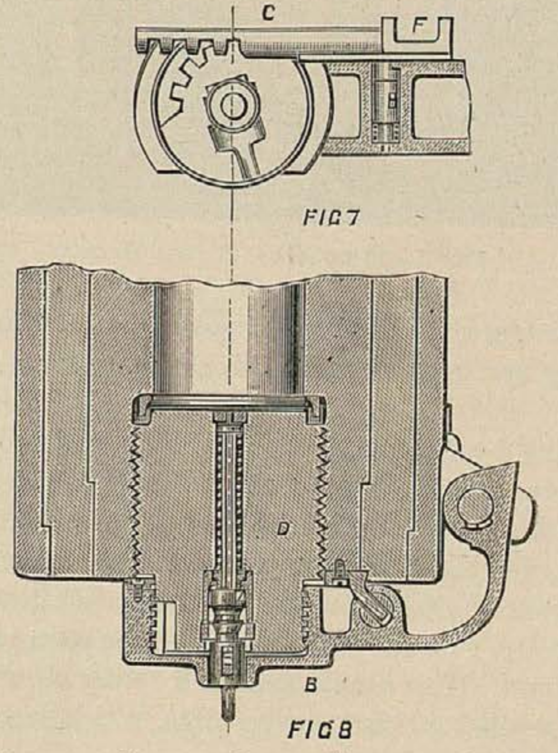


FIG. 6.
SECTIONAL PLAN OF BREECH MECHANISM.



SECTIONAL PLAN OF BREECH MECHANISM CLOSED.

the instant when the closing of the breech is completed, and determines the electric contact of the spring and the check. Firing is effected by means of a circuit closer, worked at will by the pointer or laying number at the gun.

The breech is opened by a single motion. In working the lever handle, the clamping catch disengages itself from the cover, thus allowing the movement of the working lever. The pin of this lever draws back the rack which turns the screw, whose rotation draws back the striker and compresses its spring. At the end of this movement the sear engages on the piece at the rear end of the striker and thus holds it cocked. As the unscrewing finishes the side of the axis of the hinge strikes the cover and draws it in its continued movement of rotation until it is stopped by contact against the gun. The breech is then fully open. When the unscrewing of the breech Working

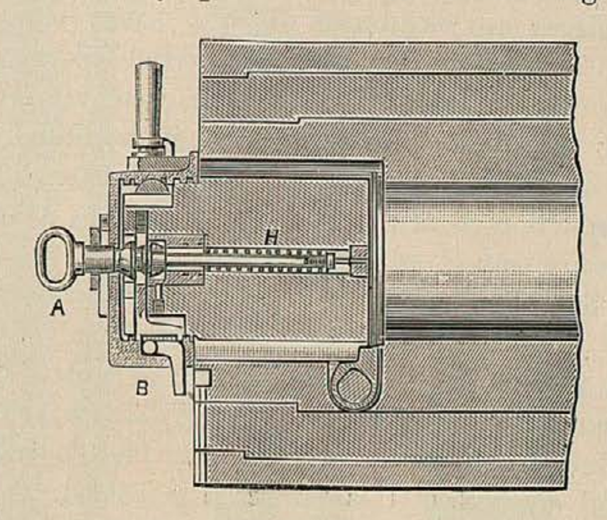


Fig. 9.

Section of Breech Mechanism.

screw is completed, and the cover begins to swing round on its axis, the catch bolt actuated by its spring engages in the rack and holds the screw at rest in the cover, and when the breech is nearly clear of the gun the groove of the pin presses on the button of the extractor axis, and this last turning dislodges and then ejects the empty case to the rear, which the gunner catches with his hands.

As before said, one movement closes the breech. After entering the charge in the gun the lever is completety moved from right to left. This performs the entire work in its stroke, for the pin is engaged throughout in the rack, and this latter is fixed in the cover by its bolt, but when the cover meets the end of the gun a projection fixed in the piece brings down the bolt of the rack, this last becomes free, and actuated by the pin of the lever turns the breech screw.

Safety arrangements.

The percussion and electric gear alike prevent firing from being effected before the breech is completely closed. The sear being placed in the screw and the trigger in the shutter, the action of one on the other can only take place when the nose of the sear comes on to that of the trigger; and in this way it is impossible to fire the gun if the breech is not completely closed. So with the electric firing. One of the connecting pieces is fixed on the cover, the other is in contact with the body of the gun and carriage, so that so long as the breech is not completely closed, no contact is made. As already said, the clamping of the lever handle prevents the unscrewing of the breech. Lastly, a special safety arrangement prevents the breech from opening if firing has not taken place, either from a missfire or hang-fire.

Double Schneider-Canet Q.-F. gun.

Messrs. Schneider have recently brought out a design in which two Q.-F. pieces are combined in the same mounting in a double sleeve and cradle, for which the following advantages are claimed: (1) compactness; (2) minimum weight; (3) less space occupied on the deck; (4) more ease of working; (5) speed; (6) decrease of friction by special arrangements; (7) decreased strain; (8) reduction of men to work the piece; (9) greater power of concentrating fire on a given point.

Schneider-Canet Q.-F. ammunition.

M. Canet has brought out a pattern of ammunition containing a special shell applicable to all purposes, consisting of balls set in discs of cast iron as shown in Fig. 10. The central space is filled with a compound generating a great quantity of smoke, so as to give a burst which is very visible, and possessing high incendiary power. The structural strength of this projectile is considerable, and it is capable of producing great effect on both men and buildings. The metal cartridge is kept separate, but united to the projectile by a bayonet joint fitting (see Fig. 10). This enables the powder and projectile to be stored separately.

Accidents. Sissoi Veliky gun accident.

The explosion on board the Russian armour-clad Sissoi Veliky was noticed in the last Annual. The accident occurred in loading before the breech was closed, or else because the breech was left imperfectly closed when the gun was fired. The latter appears to have been the case, and the obvious lesson to be learned is the necessity of the safety gear existing in the guns of most Powers, which prevents firing till the breech is locked, and so renders such an accident impossible. Doubtless the 12-in. Obukhof guns supplied to the Sevastopol, Petropavlosk, Poltava, and Tria Sviatitelia, which are said to be of the same type as those of the Sissoi Veliky, will be fitted with safety-gear, and, indeed, all other guns exhibiting this deficiency, as opportunity occurs.

On September 22nd, 1897, while H.M.S. Galatea was engaged in gun practice, the after 9·2-in. gun at the second round burst with terrific force, killing one man. The gun had been carefully examined about three weeks previously, and was believed to be in sound condition. The manufacture of gun tubes has greatly advanced during the last fourteen years, that is, since this piece was made. It would no doubt Galatea gun accident.

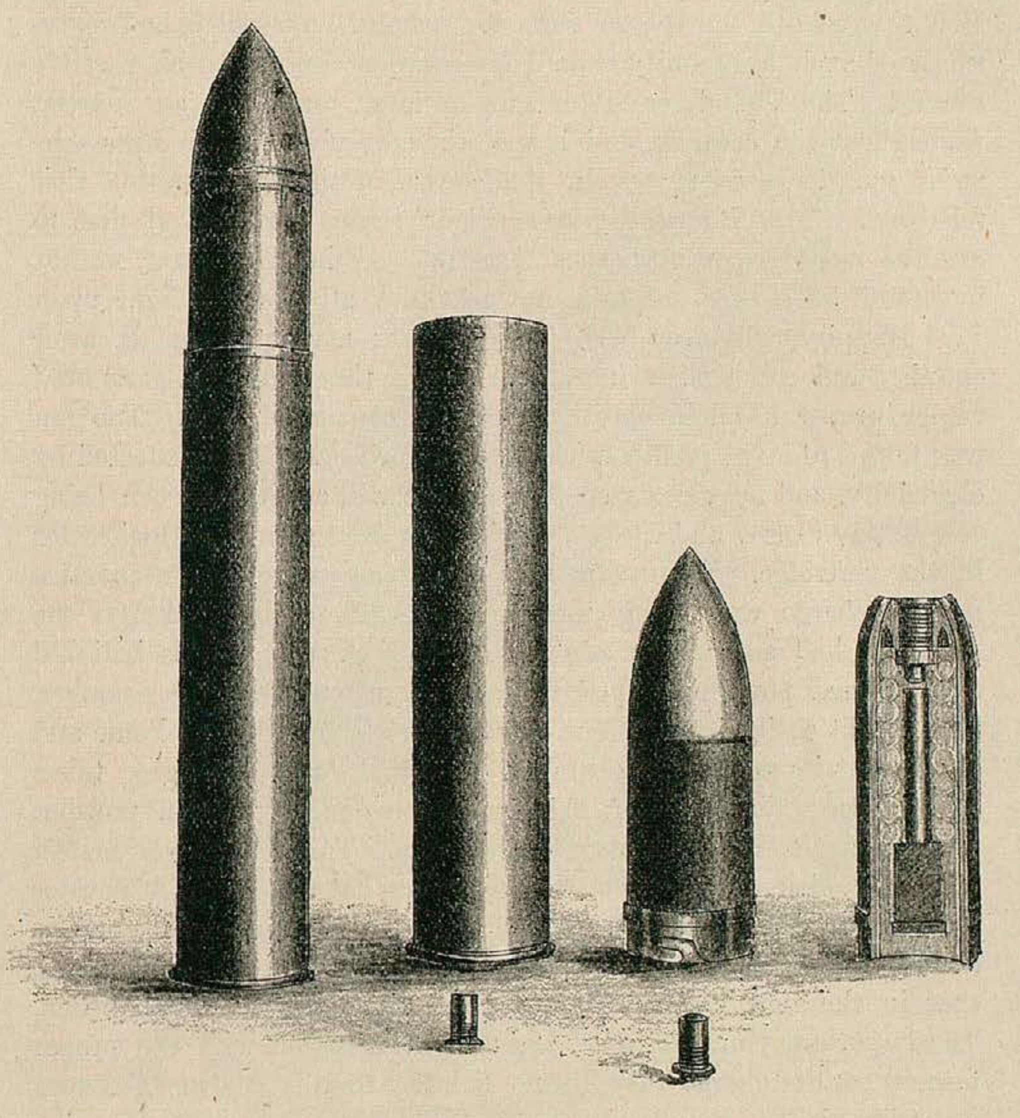


FIG. 10.

SCHNEIDER-CANET QUICK-FIRE AMMUNITION.

be satisfactory if it could be said this gun was out of the service. That cannot be said; but the pattern has long been superseded, and pieces which are better both in design and in quality gradually take the place of those of the pattern of the Galatea gun.

On January 26th, 1898, the gunboat Bo uncer was practising at the

Bouncer gun accident.

Nore, and as her 6-in. Q.-F. gun was being loaded for the eighth or ninth round, the charge exploded just before the breech was completely closed and locked, killing two men instantly and injuring six others. The gravity of such an accident is not at all to be measured by the loss of life, however deplorable. The 6-in. Q.-F. gun, as before noticed, is a specially important piece used throughout the Navy. For this reason the matter calls for exhaustive enquiry, and recurrence of such a calamity should be guarded against by all possible means. The Thunderer 38-ton gun accident awakened an interest throughout the country, and it was thought desirable to burst the twin gun, large as it was, in the course of the investigation that followed. The Bouncer gun accident really appeared at first to involve more important issues than that of the Thunderer, so that it would be a great mistake not to throw all possible light upon it. Happily, whatever obscurity or doubt may still remain after enquiry and experiment, it may be shown that our Q.-F. guns fired under proper normal conditions are not concerned by it. The gun was found to be in perfect working order, firing was being effected by electricity, and no circuit could be made without the breech being completely closed and locked, so that the cause must be looked for in the cartridge. It appears that what may be termed a practice *powder* charge was being used, not one of cordite, and that the cartridge had suffered in store and handling, so that it is believed that crushed powder escaped from the front end into the chamber. This might easily happen if an injured cartridge were shot home and checked at its seat in the chamber. In quick-fire no sponging takes place. In ordinary firing this would be dangerous with powder, which is apt to leave unburnt hot residue. This might not matter with Q.-F. charges inside sound copper cases, but any escape of powder would naturally cause explosion. This or any other solution must be abundantly established before the question is closed, especially seeing that in the new Vickers Q.-F. gun the metal cartridge is abolished. The important point to make clear, however, is that with the proper normal cordite charge there is no liability to this accident, because no residue is left, and because cordite would not crush and escape like powder dust.

Sims-Dudley powder-pneumatic gun.

In the Chicago Exhibition of 1893 appeared a design for safely firing projectiles containing high explosives, bearing the name of the "Dudley Dynamite Aërial Torpedo." This has since assumed a definite working shape, and claims to have achieved such success as to bid fair to become an element in various branches of warfare. The principle and general arrangement is exactly the same as it was in the Chicago exhibit. The object is to discharge a shell containing a

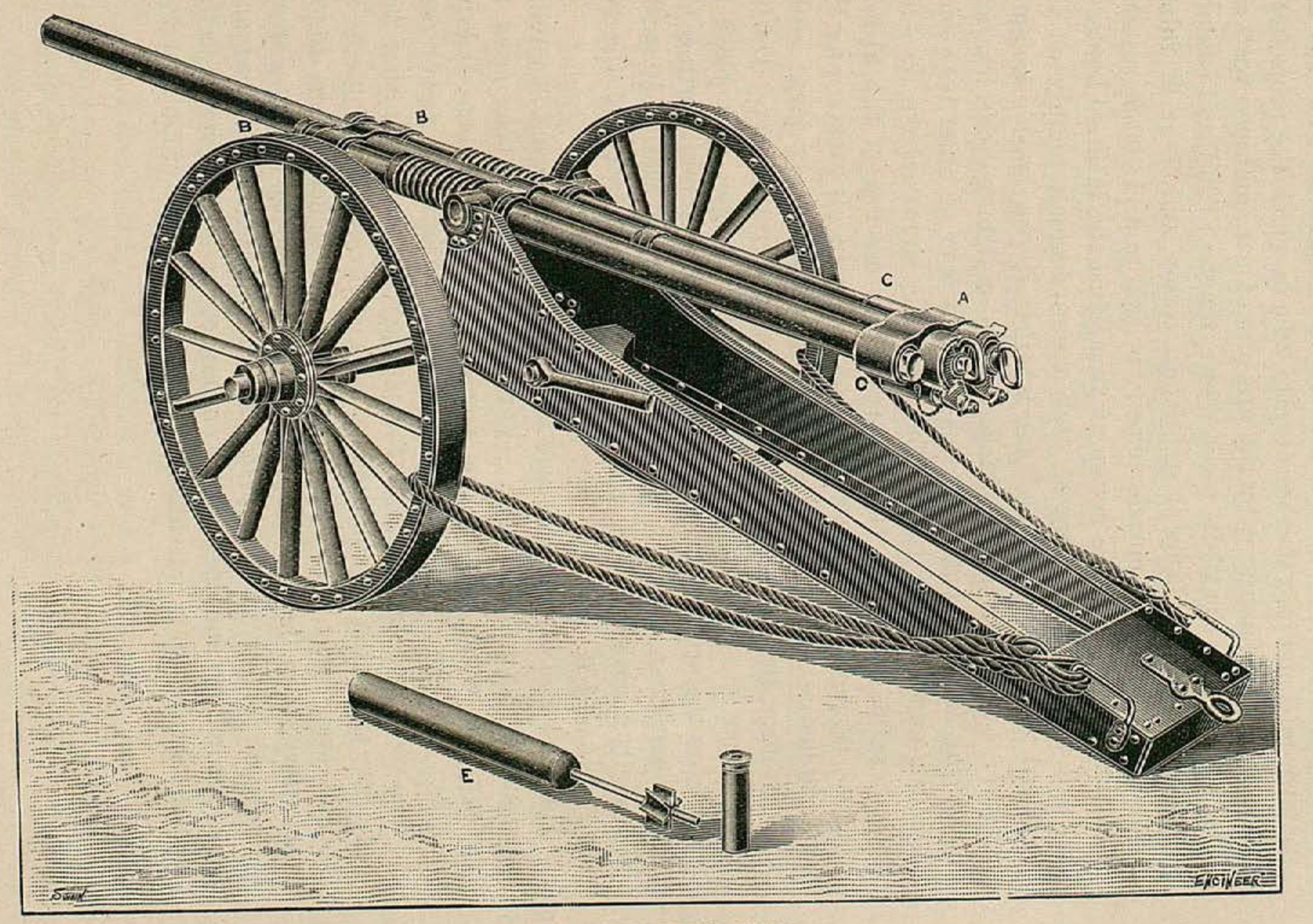


FIG. 11.—DUDLEY GUN.

large charge of high explosive from a light piece with safety. To effect this, three tubes or barrels are employed fixed side by side, as shown in Fig. 11. An 8-oz. charge of cordite is fired in tube A, when the generated gas rushes through the connecting tube BB and so down to C and into the long centre tube in which the projectile is placed, thus discharging it by the pressure of gas combined with air. The projectile for the 2½-in. piece shown weighs 13 lbs., and contains 4 oz. of explosive gelatine, 6 oz. of gun cotton, and 30 gr. of fulminate of mercury. Its muzzle velocity is said to be 1,000 ft. seconds. Rotation is given by the action of air against the inclined blades of the tail piece. The future of such a gun depends mainly on the standard of accuracy attained, and whether it can be conveniently worked. The gun and carriage above—weighing 550 lbs. and measuring in total length 12 ft.—forms a sort of cross between a howitzer and a rocket tube. The projectile shown above does not look hopeful, but might be improved. The essence of the idea is the use of powder as a ready means to obtain air pressure for the safe discharge of high explosives on a comparatively large scale. The inventor thinks that it might be used in torpedo-boats. During the summer of 1897 a trial of the Sims-Dudley gun took place at Silloth, on the artillery range of Sir W. Armstrong, Whitworth & Co. The longest range at which projectiles were thrown was 1,750 yards. The shells made very large craters, considering the nature of the wet sand, that is, 4 ft. deep and from 6 to 8 ft. in diameter.

The Dum-Dum Bullet.

The condition of the small-arm bullet, both in our own and foreign equipments, is unsatisfactory. Various means have been tried to remedy the want of stopping power of the small bore 0·3-in. bullets. In the Dum-Dum and Tweedie bullets the nickel case is removed more or less from the point, with the result that not only does the bullet set up, but also the nickel case flies in pieces in an undesirable way. The Mark III. bullet, designed in the Royal Laboratory, is made to set up to a certain extent by having a small cylindrical hollow in the point. The nickel covers the head and lines the hollow, and does not fly on impact; it is, however, objected that the setting up is not sufficient to give the desired stopping power or shock.

NOTES ON TABLES OF ORDNANCE.

THE authorities on which the data in the Ordnance Tables are based were given in detail last year and need not be repeated.

Speaking generally, the British and United States Tables are corrected by figures from official sources. The Tables for the Continental powers are mainly taken from the *Austrian Marine Almanack.* The energies and perforations however are worked out independently, as explained below. The Q.-F. Ordnance Tables are obtained directly from the manufacturers and the data in them are given on their authority.

Great alterations have been made in the Spanish Table.

During the last year Tresidder's formula has been recognised and used in official papers, and this even for velocities below 2000 ft.-secs. Consequently it has been concluded that it is best to follow the course indicated in the *Annual* for 1896, p. 363, that is to say, to employ Fairbairn's or Maitland's formula only for velocities up to 1580 ft.-secs. For these low velocities they have been thoroughly tested and found good, and for these it would be a mistake to alter the existing tables based on them. About 1580 ft.-secs. the formulæ of De Marre, Krupp, Tresidder, Maitland and Fairbairn all agree fairly well. At this point, then, it is convenient to "shunt," as it were, from the Fairbairn, on to the Tresidder curve, for British Tables. Krupp's formula gives nearly the same results as Tresidder's, and it makes little difference which of the two is employed, and in some foreign Tables where Krupp's formula has been used it is left undisturbed, Tresidder's being often added to enable a comparison to be made. The actual formula used is nearly always stated on the face of the Table. The systematic application of Tresidder's formula has involved much fresh calculation and correction, especially in the British Tables, for the sake of what may appear to be trifling corrections, but so soon as a definite course became justified by official action it appeared well to adopt it completely. The weak feature in it is that, while unquestionably the results now given for really high velocities are much more nearly true than those formerly given, they are not based on anything approaching a sound investigation so far as England is concerned. We are in fact depending partly on individual results connected and worked up empirically, and partly on a theory which, however ingenious, is not acknowledged as sound by the highest mathematical authorities. Considerable increase of weight is doubtless given to Tresidder's formula owing to the fact of his having independently arrived at a result so closely in accordance with that of Krupp's that a small assumption makes the two identical. Let us hope that Krupp has investigated the question more thoroughly than we have in this country.

BRITISH RIFLED ORDNANCE.

(Chiefly founded on the official "List of Service Ordnance, 1891." Corrected by Official List, 1895, card issued 1896, and subsequent information.)

	Ordnance. Nature. Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Rifling. Twist one turn in. Least at breech.	Rifling. Twist one turn in. Greatest at muzzle.	System.†	Charge (full). Weight.‡	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.§	Projectile. Bursting Charge of Common Shell.	Value of $\frac{d^3}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	At 1000 yards range.	At 2000 yards range.
					calbs.	ins.	ins.	cals.	cals.		lbs.	lbs. oz.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.
B.L. GUNS.	16·25-in.	110½ tons.	I.	524·0	30·0	21·125	84·5	130	30	P.E.O.C.	960 S.B.C.	..	..	16·25	1800	‡‡187¼ **179¾	0·147	0·420	2087	54,390	492	38·0	34 6	31·7
	13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5	120 or 60	30	P. Rifling increasing twist, in E.O.C. System from 0. Hook Sect. II. from 1 in 60; all others belong to Hook Sect. I. except 12-in. wire, which is special.	630 S.B.C.	..	..	13·5	1250	**85 9/16	0·146	0·508	2016	35,230	511 526	33·0	30·2	27·6
	12-in.	45 & 46 tons.	III. IV. V. & V.w	328·5	25·25	16·0	48·0	120	35		295 P.Br.	88 8	30	12·0	714	31 9/16 ‡‡95 **79	0·202	0·413	1914	18,130	403 394	24·4	21·5	18·9
	12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0	0	30		..	167 8	50	12·0	850		0·169	0·492	2367	33,020	718	36·8	32·7	29·4
	10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0	60	30		252 P.Br.	..	..	10·0	500	37¾	0·200	0·500	2040	14,430	498	24·8	21·8	19·3
	9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0	118·5	35		140 P Br.	..	..	9·2	380	18½ ‡‡33	0·223	0·488	1781	8,356	411 392	18·3	15·9	14·4
	9·2-in.	24 & 22 tons.	III. V. VI. VI.A&c & VII.	310·0	31·5	12·0	43·0	120	30		164 P.Br.	..	..	9·2	380	**31 14/16	0·223	0·488	2065	10,910	455 496	22·9	19·8	17·2
	9·2-in.	25 tons.	Wire VIII.	..	40 08	..	..	..	..		..	63 0	40	9·2	380	..	0·223	0·488	2347	14,520	581	27·6	23·9	20·7
	9·2-in	27 tons.	Wire IX.	..	46·74	..	..	..	..		..	..	..	9·2	380	..	0·223	0·488	2700d	19,220	712	34·3	..	..
	8-in.	14 tons.	III.	226·3 222·5	25·1	10·5	34·5	120	35		104 P.Br.	28 12	20	8·0	210	13½ ‡‡29	0·305	0·410	1953	5,554	427 397	16·8	13·8	11·7
	8-in.	15 tons.	IV.	254·5	29·6	10·5	38	110	35		118 P.Br.	32 10	20	8·0	210	‡‡18½	0·305	0·410	2150	6,730	449	19·3	15·9	14·4
	8-in.	14 tons.	VI.					60	30															
	6-in.	82 cwt.	(80 pr.)	162·6	26·0	7·5	27·4	0	40		34 S.P.	..	..	6·0	80	6 2/16 ††7¾	0·450	0·370	1880	1,961	484	11·2	8·4	6·8
	6-in.	5 tons.	III.	170·7	25·53	8·0	26·75	120	35		36 E.X.E. 48 E.X.E.	14 12	20	6·0	100	7 6/16 **9 13/16	0·360	0·463	1960	2,665	533	13·4	10·7	8·9
	6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75	120 60	35 30		48 E.X.E.			6 0										
	5-in.	38 cwt. 40 cwt.	II. III. IV. & V.	139·15	25·07 25·0	5·75	19·05	117 120	25	All Hook Section I. or II. P.	15·5 S.P.	4 7¼	7·5	5·0	50	4 1/16 ‡‡6 15/16	0·500	0·400	1750	1,062	559 531	8·8	6·6	5·3
	4-in.	23 cwt. 26 cwt.	II. II.P III. III.A IV. V. & VI.	120·0	27·0	5·3	18·5	120	30		12 S.P.	3 1	5	4·0	25	2 14·5/16	0·640	0·391	1900	625	544 481	7·7	5·4	4·0
	20-pr. (3·4)	12 cwt.	I. (L.)	107·5	29·0	3·9	15·5	120	25		6 S.P.	..	..	3·4	18·6	2 1/16	0·593	0·496	1677	380	633	..	..	..
	12-pr. (3·0)	7 cwt.	I. (L.)	92 35	28·0	3·63	11·0	120	28		4 S.P.	1 0¼	5	3·0	12·5	‡‡1 8·5/16	0·720	0·463	1710	256	740	..	..	..
M.L. GUNS.	17·72-in.	100 tons.	I. L.	391·85	20·48	19·7	59·72	150	50	P.Pl.	450 Pr.[1] Bl. or Pr.[2]	..	..	17·72	2000 0	106	0·157	0·359	1548	33,220	332	25·2	23·5	21·7
	16-in.	80 tons.	I.	321·0	18·0	18·0	59·6	0	50	P.Pl.	450 Pr.[1] Br	..	..	16·0	1700 0	75 6/16 c112 8/16	0·151	0·415	1540	27,960	350	24·3	22·5	20·9
	12·5-in.	38 tons.	I.	230·0	15·84	Unchambered		0	35	W.	130 Pr.[2] or 165 Pr.[1] Bl	..	..	12·5	818·0	37 8/16	0·191	0·419	1442	11,820	311	17·4	16·0	14·7
	12·5-in.	38 tons.	II.	222·8	15·84	14·0	41·125	438	35	W.	200 E.X.E. 210 Pr.[2] or 190 Pr.[1] Bl								1575	14,070	371	19·5	17·8	16·3
	12-in.	35 tons.	I.	195·0	13·54	Unchambered		0	35	W.	110 Pb.[2]	..	..	12·0	714·0	34 10/16	0·202	0·413	1340	8,890	273	15·5	14·4	13·2
	12-in.	25 tons.	II.	182·5	12·09	"		100	50	W.	85 Pb.[2]	..	..	12·0	614·0	28 2/16 c61 10/12	0·235	0·355	1292	7,109	288	13·4	12·1	11·0
	11-in.	25 tons.	II.	180·0	13·18	"		0	35	W.	85 Pb.	..	..	11·0	548·0	27	0·221	0·411	1360	7,028	281	14·2	12 9	11·7
	10-in.	18 tons.	II.	180·0	14·55	"		100	40	W.	70 Pb.	..	..	10·0	410·0	23½	0·244	0·410	1379	5,408	300	13·1	11·7	10·5
	9-in.	12 tons.	V.	156·0	13·89	"		0	45	W.	50 Pb.	13 4	7½	9·0	256·0	17	0·316	0·351	1440	3,681	307	11·4	9·8	8·5
	8-in.	9 tons.	III.	144·0	14·75	"		0	40	W.	35 Pb.	..	..	7·92	179·0	→ 17 12/16	0·358	0·350	1391	2,398	266	9·7	8·2	7·1
	7-in.	90 cwt.	I.	131·0	15·86	"		35	35	W.	22 Pb.	..	..	6·92	114·6	→ 11 1/16	0·428	0·334	1325	1,395	310	7·9	6·5	5·7
	7-in.	6½ & 7 tons.	III. & IV.	133·0	15·86	"		35	35	W.	30 Pb.	..	..	6·92					1525	1,848	284	9·2	7·2	5·9
	64-pr.	64 cwt.	III.	118·0	15·47	"		40	40	Pl.	10 R.L.G.[4]	..	..	6·28	64·5	→ 8 8/16	0·588	0·271	1390	865	270	..	..	..
	64-pr.	71 cwt.	I.	122·72	16·42	"		40	40	Pl.	8¼ R.L.G.[4]	..	..	6·29	64·5	→ 8 8/16	0·588	0·271	1260	715	201	..	..	..
	40-pr.	35 cwt.	II. L.	120·0	22·0	"		35	35	W.	6¾ R.L.G.[4]	..	..	4·75	38·8	→ 3 6/16	0·582	0·362	1425	546	312	..	..	..
	25-pr.	18 cwt.	I. L.	98·0	22·0	"		35	35	W.	4½ R.L.G.[4]	..	..	3·94	24·96	→ 1 13/16	0·622	0·408	1350	315	350	..	..	..
	16-pr.	12 cwt.	I. L.	78·0	19·0	"		30	30	F.M.	3 3/16 R.L.G.[4]	..	..	3·54	16·1	→ 1 2/16	0·771	0·366	1355	205	342	..	..	..
	15-pr.	422 lbs.	I. L.¶	70·5	20·0	3·2 (decrsd.)		60	20	P.	1½ R.L.G.[2]	..	..	3·3	14·25	2 6/16	..	..	1040	113	600	..	..	..
	13-pr.	8 cwt.	I. L.	92·0	28·0	3·15	14·13	100	30	P.	3¼ R.L.G.[4]	..	..	3·0	13·0	11/16	0·689	0·484	1595	232	580	..	..	..
	9-pr.	8 cwt.	I. & II.	72·0	21·17	Unchambered		30	30	F.M.	1¾ R.L.G[2]	..	..	3·0	9·1	→ 8 12/16	0·996	0·335	1330	119	298	..	..	..
	9-pr.	6 cwt.	I.	61·0	17·67	"		30	30	F.M.	1½ R.L.G.[2]	..	..	3 0					1250	97	323			
	9-pr.	6 cwt.	II. III. IV.	74·5 74·875	22·0	"		30	30	F.M.	1¾ R.L.G.[2] 1½ R.L.G.[2]	..	..	2·94	9·1		0·956	0·356	1330	119	397	..	..	..
	2·5-in.	400 lbs.	I. & II. L.¶	70·45	26·6	2·56	11·07	80	30	P.	1½ R.L.G.[2] or 1 10/16 R.L.G.	..	..	2·5	7·25	4·5/16	0·819	0·488	1440	101	377	..	..	..
	7-pr.	200 lbs.	IV.	41·0	12·0	Unchambered		20	20	F.	¾ R.F.G.	..	..	2·94	7·29	→ 7·25/16 14·5/16	1·185	0·287	950	46	515	..	..	..
R.B.L. GUNS (screw).	7-in.	82 cwt.	..	120·0	14·21	7·2	16·0	37	37	P.	11 R.L.G.[2]	..	..	7·0	91·25 108·3	8 4/16 10 6/16	0·537	0·266	1100	909	222	..	..	..
	40-pr.	35 & 32 cwt.	..	121·0 & 120	22·39	4·96	13·5	36½	36½	P.	5 R.L.G.[2]	..	..	4·75	40·7	2 6/16	0·554	0·380	1160	380	217	..	..	..
	20-pr.	15 & 13 cwt.	..	66·125	14·43	3·94	11·0	38	38	P.	2½ R.L.G.[2]			3·75	21·8	1 5/16	0·645	0·414	1000	153	203	..	..	..
	12-pr.	8 cwt.	..	72·0	20·458	3·2	8·5	38	38	P.	1½ R.L.G.[2]			3·0	11·25	8/16	0·800	0·417	1239	200	299	..	..	..
	9-pr.	6 cwt.	..	62·0	17·5	3·2	7·0	38	38	P.	1⅛ R.L.G.[2]	..	..	3·0	8.56	6/16	1·052	0·317	1055	66	220	..	..	..

L., Land service only. * The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c.
† P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry; E.O.C., Elswick Ordnance Co.
‡ S.B.C. (in column for charge) means Slow-burning Cocoa; P.Bl. stands for Prismatic Black; P.Br. for Prismatic Brown; Pb., Pebble; R.L.G., Rifle Large Grain; L.G., Large Grain; E.X.E., Experimental letter E.
§ For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell. ** Cast steel. ‡‡ Forged steel. †† Double shell. ‖ For high-angle fire.
¶ Mountain-service jointed gun. §§ There is a 6-cwt. 12-pr. Wire Gun for land service. → Studded projectiles. c For steel common shell. d Estimated.

BRITISH RIFLED ORDNANCE—*continued.*

(Chiefly founded on the official "List of Service Ordnance, 1891." Corrected by Official List, 1895, and subsequent information.)

Ordnance. Nature. Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter.	Chamber. Length to base of projectile.	Rifling. Twist one turn in Least at breech.	Rifling. Twist one turn in Greatest at muzzle.	Rifling. System.†	Charge (full). Weight.‡	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.§	Projectile. Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron. At muzzle.	At 1000 yards range.	At 2000 yards range.
				calbs.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft.tons.	ins.	ins.	ins.
QUICK-FIRING GUNS										lbs. oz.													
6·0 in.	7 tons	I. & III.	249·25	40	..	..	60	30	P.	29¾ E.X.E.	13 4	30	..	100·0	..	0·360	0·463	1882	2457	351	12·6	10·1	8·0
		II. (Wire)																2200	3356	479	15·9	12·7	10·2
		I. to VI. converted. Details depend on pattern converted																1913	2537	362	13·0	10·3	8·2
6·0 in. Vickers	$7\frac{8}{20}$ tons			45										100·0		0·360	0·463	2784	††5373	726	22·7	18·1	14·3
4·7 in.	41 cwt.	I. II. III. & IV. Wire	194·1	40	..	..	100	34·4	E.O.C.	12 0 S.P.	5 7	20	4·72	45·0	..	0·495	0·428	1786	995·4	485·7	9·2	6·7	4·9
	42 „																	2188	1494	711	12·4*a*	9·2	6·6
4 in.	26 cwt.	I. Wire	165·25	40	..	...	..	30	P.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300	1046	654	10·5*a*	6·9	4·9
12-pr.	12 cwt.	I.	123·6	40	..	..	120	28	E.O.C.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5
12-pr.	8 cwt.	I.	87·6	28	..	..	60	28	E.O.C.	..	13¾	10	3·0	12·5	..	0·667	0·500	1585	223·8	544	4·9	3·2	2·4
Hotchkiss . 6-pr.	8 cwt.	I. & II.	97·63	40·0	..	..	180	29·9	P.Pl.	1 15 Q.F.	*b*7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..
Nordenfelt . 6-pr.	6 cwt.	I. II. & III.	104·4	42·3	..	..				1 15 Q.F.													..
Hotchkiss . 3-pr.	5 cwt.	I. & II.	80·63	40	..	..	25	25	P.Pl.	1 8 Q.F.	*b*6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..
Nordenfelt . 3-pr.	4 cwt.	I. L.	91·5	45·4		..							..	..	..	..	..	1920	..	..	4.3	2·2	..
MACHINE GUNS.										grains.				oz. grs.									
Nordenfelt, 2 bar 1-in.	180 lbs.	I.	52·75		..	..	35	35	H.	625 M.G.	..	..	1·0	7¼ 0	..	2·207	0·453	..	..	..	¾-in. at 200 yards.		
„ 4 bar 1-in.	447 lbs.	III.**	57·0		..	..	35	35	H.														
„ 5 bar 0·45-in.	160 lbs.	I. G. G.	46·0		..	..	22	22	H.														
	143 lbs.	II. G. G.	42·25		..	..	22	22	H.														
Gardner, 1 bar 0·45-in.	76 lbs.	I. G. G.	47·0		..	..	22	22	H.	85 R.F.G_2.	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle, which perforates ⅛ in. wrought iron plate at 600 yds., 3/16 in. at 400 yds., ¼ in. at 100 yds.		
„ 2 bar 0·45-in.	120 lbs.	I. G. G.	47 0		..	..	22	22	H.														
„ 5 bar 0·45 in.	268 lbs.	I. G. G.	53·5		..	..	22	22	H.														
Gatling, 10 bar 0·65 in.	787 lbs.	..	66·5		..	..	30	30	H.	270 R.F.G_2.	..	..	0·65	1422	..	2·109	0·730	..	..	..	Not known.		
„ 10 bar 0·45-in.	402 lbs.	I. G. G.	59·0		..	..	22	22	H.														
„ (Acclesfeed)	266 lbs.	I. G. G.	51·0		..	..	22	22	H.	85 R.F.G_2	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle		
Maxim, 1 bar 0·45 in.	63 lbs.	I. G. G.	43·75		..	..	22	22	H.														

* L., Land-service only, but might concern navy when serving on land. The Roman numeral is the number of the pattern given. † P. means Polygroove; Pl., Plain; W., Woolwich; F., French; F.M., French modified; H., Henry. E.X.E., Experimental letter E. § For the higher natures the weight of projectile given is for Palliser shot; for the lower natures it is for filled common shell.

** I. and II. differ chiefly in being 7 lbs. lighter; I. has a pitch of rifling of 1 in 60 in.; G.G., Gardner Gatling; H., Henry. *a* The 4·7 and 4-in. shot must perforate 5 inch, and the 12-pr. shot 4 inch water-hardened steel plate. *b* With 4 drs. R.F.G. †† With a new gun at Portsmouth and must be regarded as the maximum effect.

AUSTRIAN NAVAL ORDNANCE.

	Krupp Steel B.L. Guns.											Uchatius. St., Br.					Cast Iron BL.	Skoda Q.F.				
Designation by Calibre, in centimètres	30·5 L. 35 C. 80	26 L. 22	24 L. 35 C. 86	24 L. 22	21 L. 20	15 L. 35 C. 86	15 L. 35 C. 80	15 L. 26	15 L. 26	12 L. 35 C. 80	12 L. 35 C. 87	15 L. 25	15 L. 37	12 L. 35	9 L. 24	7 L. 15	15 L. 21	3·7 L.23	4·7 L. 44	7 L. 42	12 L. 40	15 L. 40
Calibre, in inches	12·01	10·24	9·45	9·27	8·24	5·87	5·87	5·87	5·87	4·72	4·72	5·87	4·72	4·72	3·43	2·60	5·87	1·46	1·85	2·76	4·72	5·90
Length — Total, in Feet	35·11	18·77	27·60	17·16	13·73	17·13	17·13	12·63	12·63	13·8	13·8	12·19	14·38	13·97	6·76	3·28	10·13	3·14	6·72	9·02	15·75	19·69
Length — Rifled Portion, in inches	314·8	148·4	233·2	135·9	105·0	151·4	149·6	105·7	111·6	128·5	126·3	111·4	123·2	123·8	57·5	23·8	89·8	..	..	..	..	..
Length — Powder Chamber "	69·9	46·1	69·3	41·7	37·0	37·8	35·4	29·3	23·4	24·0	26·3	23·6	36·6	31·65	16·5	11·0	18·0	..	..	..	..	..
Length — Of bore in calibres	35	19·0	35	22·0	20·0	35	35·0	25·8	25·8	35·0	35	24·9	37	35·0	23·7	15·0	18·4	..	..	..	..	..
No. of Grooves	68	32	25	32	30	36	36	24	36	32	32	36	32	32	24	18	30	..	..	..	..	..
Twist in calibres	..	70	26·9	70	59	45—25	25	68·4	45	25	25	45	45—25	25	45	30	63·2	..	..	..	..	..
Weight — Gun, tons	47·8	21·7	26·5	14·5	8·68	5·7	4·69	3·94	3·94	2·25	2·46	3·35	3·2	2·85	0·479	0·09	2·81	..	..	..	..	..
Weight — Breech Block, in lbs.	..	1951	..	1422	1080	445·3	..	321·9	321·9	..	..	209·4	..	211·6	55·1	18·7	176·4	..	..	..	..	..
Weight — Steel Shell "	1003·1	395·7	474·0	292·1	206·6	112·5	86·0	72·8	84·9	57·3	57·3	84·9	57·3	57·3	..	..	..	..	3·3	8·82	52·4	100·3
Weight — Chilled Shell "	..	..	..	..	196·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight — Common Shell "	1003·1	354·2	474·0	263·5	172 0	112·5	69·9	67·2 / 65·5	69·4	57·3	57·3	69·45	57·3	57·3	14·02 / 14·22	6·42	6·11	..	..	..	..	..
Weight — Shrapnel Shell "	..	..	..	..	..	112·4	71·9	67·2 / 65·5	69·4	57·3	57·3	69·45	57·3	57·3	15·76	6·88	6·79	1·0	3·3	8·82	52·4	100·3
Weight — Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16·53	6·94	38·4	..	..	..	..	..
Weight of Bursting Charge — Steel Shell "	10·6	8·8	5·1	6·6	4·4	1·3	1·76	1·65	2·09	0·55	0·55	2·09	0·53	0·55	..	..	..	..	..	..	..	..
Weight of Bursting Charge — Chilled Shell "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge — Common Shell "	35·7	20·3	17·9	15·0	15·0	5·29	3·86	3·86	5·07	2 2	2·2	5·07	2·20	2·21	0·46	0·18	1·87	..	..	..	..	..
Weight of Bursting Charge — Shrapnel Shell † in lbs.	..	..	..	..	..	1·26	1·10	1·08	1·08	0·57	0·57	1·08	0·57	0·57	0·20	0·09	0·90	..	..	..	..	..
Weight of Firing Charge — Steel and Chilled Projectile, in lbs.	308·6B	89·3 B	105·8A	76·1 B	50·7 C	39·0p	38·8*	21·6 C	20·9 C	19·8 B	17·0A	20·9 C	30·0 B	19·8 B	..	..	..	..	1·10	2·43	9·70	18·7
Weight of Firing Charge — Common Shell, in lbs.	308·6B	59·5	105·8A	44·1	30·9	39·0p	38·8*	14·3 / 21·6 C	20·9 C	19·8 B	17·0A	20·9 C	30·0 B	19·8 B	3·31 / 0·97	0·77 O / 0·35	4·74O	..				
Weight of Firing Charge — Exercising, in lbs.	154·3B	59·5	52·9A	44·1	30·9	28·7	19·6	21·6 C	20·9 C	11·0	..	20·9 C	19·8 B	12·13 B	3·31	0·77 O / 0·35	4·74O	·176				
Weight of Firing Charge — Saluting "	19·8	19·8 O	15·4O	15·4 O	8·82 O	4·74	4·74 O	4·74 O	4·74 O	2·4	2·4	4·74 O	2·4	2·4	0·88 O	0·35	4·74O	..	..	..	..	..
Muzzle Velocity, in feet	1755·3	1575	2100	1587	1519	1962	1969	1641	1562	1755	1969	1562	1755	1755	1470	978	1017	1345	2329	2297	2297	2297
Muzzle Energy — Total, foot-tons	21,420	6808	14,500	5104	3306	3000	2312	1358	1435	1215	1541	1435	1224	1224	..	..	..	12·6	1242	322·8	1922	3767
Muzzle Energy — Per inch circumference, foot-tons	567·8	211·6	488·3	175·3	127·7	162·8	125·4	73·7	77·9	82·5	104·0	77·9	82·45	82·45	..	..	..	..	..	..	..	..
Thickness of Iron, perforated inches at Muzzle	22·1§	15·0§	27·4‡	13·7§	11·6§	13·4§	11·7§	8·8§	9·1§	9·4§	10·5§	9·1§	9·5§	9·5§	..	..	..	..	..	..	..	‡18·0
Ditto by Tresidder's formula	25·2	14·7	25·8	13·4	..	14·4	12·6	8·9	8 9	9·7	11·5	8·9	9·7	9·7	..	..	..	..	..	..	13·9	17·4

NOTE.—C for cube powder; * prismatic powder; O ordinary powder (inferior); B brown prismatic. † Generally steel. A Ammon cake powder.
Prismatic Ammon powder. ‡ By Krupp's formula. § By Fairbairn's formula.

DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.											Armstrong M.L.					Finspong.
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	21 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm. short.	8·6 cm.	10 in.	10 in.	10 in.	9 in.	8 in.†	6 in.
Calibre, in inches	13·98	12·01	10·24	10·24	8·24	5·91	5·91	5·91	4·72	4·72	3·43	10·0	10 in.	10 in.	9·0	8·0	6·04
Total length, in feet	29·1	22·0	32·8	18·77	24·04	17·1	12·63	10·7	11·8	9·6	6·9	17·0	14·5	14·0	13·0	10·8	9·5
Length of Bore, including Powder Chamber — in inches	304·7	227·2	327·6	194·5	264·5	190·3	135·0	112·9	128·8	102·4	73·6	175·5	145·5	140·0	125·0	104·2	100·8
Length of Bore, including Powder Chamber — in calibres	21·8	18·9	32·0	19·0	35	32·2	22·8	19·1	27·3	21·7	21·3	17·5	14·55	14·0	13·3	13·1	16·7
Number of Grooves	80	68	60	60	48	36	36	36	32	32	24	7	7	7	6	6	6
Twist of Rifling, in calibres	45	45	70–25	45	70–25	70–25	45	45	25	40	45	40	40	40	40	50	40
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	13·3	4·7	4·4	3·5	2·13	1·39	0·49	20·0	18·5	18·0	12·5	8·65	2·46
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	903·9	390·2	330·7	324·1	229·2	176·4	101·4	..	..	..	..	..	..
Weight of Steel Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	..	86·0	..	44·1	..	400	400	400	..	..	..
Weight of Chilled Shell, „	1157·4	725·3	..	451·9	..	..	86·0	86·0	..	44·1	..	400	400	400	250·2	165·3	..
Weight of Common Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	69·4	69·4	57·3	36·2	15·2	400	400	400	250·2	131·2	55·1
Weight of Shrapnel Shell, „	1157·4	725·3	451·9	451·9	238·1	112·4	86·0	86·0	57·3	44·1	..	..	..	..	..	..	15·4
Weight of Case Shot, „	..	..	..	..	..	..	..	..	..	..	..	191·8	..	..	154·3	127·9	58·4
Weight of Bursting Charge — Common Shell, „	57·3	39·7	25·4	25·4	12·8	6·2	3·0	3·0	1·7	1·4	0·44	26·5	26·5	26·5	18·5	7·5	5·0
Weight of Firing Charge — Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	105·8	41·9	19·3	21·8	17·4	8·8	..	71·7	71·7	71·7	44·1	29·8	..
Weight of Firing Charge — Common Shell, „	330·7	180·2	191·8	112·4	105·8	41 9	19·3	21·8	17·4	8·8	3·3	71·7	71·7	71·7	44·1	19·8	60·6
Muzzle Velocity — Armour-piercing Projectile, feet	1762	1675	2018	1640	2021	1800	1565	1542	..	1416	..	1457	1368	1368	1368	1378	..
Muzzle Velocity — Common Shell, „	1762	1675	2018	1640	2021	1890	1683	1690	1720	1549	1457	1457	1368	1368	1368	1320	1076
Muzzle Energy — Total foot-tons	24910	14110	12770	8428	6745	2784	1461	1418	..	6130	..	5889	5192	5192	3246	2177	..
Muzzle Energy — Per inch circumference, foot tons	568·3	374·1	396·8	262·0	260·6	150·0	78·7	73·0	..	32·8	..	189·0	165·3	165·3	115·8	86·9	..
Perforation at Muzzle, in ins. by Fairbairn's forma.	24·8	20·0	20·1	16·7	16·9	12·8	9·1	8·8	..	5·8	..	14·1	13·1	13·1	10·9	9·5	..
ditto ditto Tresidder's forma.	25·6	20·1	22·9	16·8	18·5	15·6	12·6	..	..	..	..	..	..	..	..	..	..

NOTE.—Chilled projectiles will gradually be replaced by steel. † There is another Armstrong gun differing very little from this one.
Krupp has supplied 12-cm. and 8·7-cm. Q.-F. guns, and Bofor's Q.-F. pieces have been recently adopted and manufacture begun.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading.							Armstrong Muzzle Loading.			Dutch Breech Loading.		
Designation by Calibre, in centimètres	28	21	17	15 No. 1.	No. 2.	12 No. 1.	12	28	23	18	12 No. 2.	12*l*	7·5
Calibre, in inches	11·02	7·91	6·80	5·87	5·87	4·72	4·72	11·00	9·00	7·00	4·72	4·72	2·95
Total Length, in feet	20·01	24·04	13·94	12·63	17·13	6·89	13·78	14·42	13·00	11·00	6·89	13·78	7·87
Length of Rifled Portion of bore, in inches	170·8	222·2	112·7	111·8	151·4	61·4	128·5	119·0	104·0	95·5	61·4	..	43·2
Length of Powder Chamber "	36·4	42·4	36·0	23·2	37·7	13·0	24·0	26·0	21·9	15·5	13·0	..	6·7
Length of bore, in Calibres	18·8	35	21·9	23·0	35	15·8	35	12·1	14·0	15·9	15·8	35	17·5
Number of Grooves	64	48 / 64	42	36	44	12	32	9	6	3	12	32	20
Depth of Grooves, inches	0·069	0·059	0·118	0·118	..	0·049	..	0·20	0·18	0·18	0·118	0·06	0·049
Twist of Rifling in Calibres	45	∝ 25	45	40	25	40	25	∝ 45	∝ 45	35	40	∝ 45	∝ 30
Total Weight, in tons	27·21	12·79 / 13·98	5·51	3·94	4·72	0·79	2·26	24·46	12·50	7·17	0·93	2·31	0·21
Firing Charge { Armour-piercing Projectile, in lbs.	121·3	99·2	27·6	20·9	49·6	..	19·8	86·0	50·7	30·0	..	19·5	..
Firing Charge { Common Shell "	121·3	99·2	27·6	20·9	49·6	2·43	19·8	86·0	50·7	13·9	2·43	19·8	0·82
Weight { Armour-piercing Projectile "	560·0	308·6	132·3	86·0	112·2	41·0	57·3	533·5	249·1	114·6	..	57·3	..
Weight { Common Shell "	476·2	308·6	112·4	69·4	112·2	29·5	57·3	535·7	262·4	116·8	29·5	57·3	9·5
Weight { Case Shot "	273·4	..	63·9	41·9	..	26·5	57·3	185·2	149·9	68·3	26·5	..	9·3
Bursting Charge { Armour-piercing Projectile "	6·6	4·6	2·2	1·1	..	0·44	..	4·4	2·2	2·2	..	..	..
Bursting Charge { Common Shell "	26·5	12·3	6·6	6·6	..	2·0	..	28·7	17·6	8·8	1.8	..	0·44
Muzzle Velocity, feet	1558	1739	1558	1558	2001	971	1755	1332	1476	1558	951	1804	958
Muzzle Energy { Total, in foot-tons	9423	6471	2226	1447	3115	..	1224	6563	3763	1929	..	1264	..
Muzzle Energy { Per inch Circumference, foot-tons	272	260·7	104	84	169·0	..	82·5	191	134	89	..	85·2	..
Perforation at Muzzle, in inches	17·0	16·8 / 17·1†	10·5	9·1	13·6 / 14·8†	..	9·4 / 10·1†	14·0	11·9	9·7	..	9·6	..
Metal employed or system of construction	Steel Jacket and Hoops.		Steel-hooped.		Steel Jacket and Hoops.	Steel-hooped.	Steel Jacket and Hoops.	Steel Tube and Wrought Iron.			Bronze.		

NOTE.—The 23-cm. ML. guns also discharge 113-Kg. (249·1 lbs.) steel shells and 113-Kg. solid shot. The 18-cm. ML. guns discharge steel shells of 51-Kg. (112·4 lbs.) and segment shells of 53-Kg. (116·8 lbs.). The 7·5-cm. BL. guns discharge ring-shells of 4·3 Kg. 9·5 lbs. Of the older guns there are yet extant three sorts—rifled 16-cm. muzzle-loader (mostly bronze), and rifled bronze 7-cm. and 5-cm.

† By Tresidder's formula.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1893.					Model 1887.				1870–81.	70–81. 70–84.	1884.					1881.										
Desig. by Calibre, in cms.	34·0	30·5	27·44	24·0	19·4	34	30·5	27	19	27	32	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14	10	90	65
Calibre, in inches	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	10·80	12·6	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46	3·94	3·54	2·57
Total length, in feet	..	..	..	..	..	..	..	..	..	23·97	27·93	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3	8·6	7·1	3·58
Length of Bore, in inches	..	..	..	..	..	..	..	..	..	269·0	313·8	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6	102·6	77·9	41·2
Length of Bore, in calibres	35	40	45	40	40	42	45	45	45	25	25	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28	26	22	16
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42	30	28	20
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	0·059	0·059	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035	0·028	0·024	0·020
Rifling Twist	..	..	..	..	..	..	..	..	..	7°	7°	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°	7°	7°	8°
Total weight, in tons	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6	24·6	42·3	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2	1·18	0·54	0·09
Weight of Firing Charge: Armour-piercing Projectile lbs.	220·5	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	154·3	282·2 249·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..	..	..	..
Weight of Firing Charge: Common Shell "	..	..	..	..	..	..	..	..	..	154·3	282·2 249·1	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1	9·9	3·6	0·79
Weight: Armour-piercing Projectile * lbs.	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	476·2	760·6	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..	..	..	..
Weight: Common Shell "	..	..	..	..	..	..	..	..	..	396·8	630·5	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1	30·9	17·6	5·95
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7	39·0	19·5	7·7
Muzzle Velocity, in ft.-sec.	2625	2625	2625	2625	2625	2625	2625	2625	2625	1887	1985 1804	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936	1673	1493	113[illegible]
Muzzle Energy: Total, in foot-tons	44230	30750	22750	15170	7898	44230	30750	22750	7898	11760	20780 17160	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..	..	..	..
Muzzle Energy: Per in. circ., foot-tons	1052	815·8	670·7	511·1	329·1	1052	815·8	670·7	329·1	346·6	525·0 433·5	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..	..	..	..
Perforation at Muzzle, inches	42·5†	37·3†	33·7†	29·4†	13·4†	42·5†	37·3†	33·7†	23·7†	20·6†	26·1† 22·6†	27·6†	22·0†	19·2†	13·0†	10·7	27·6†	24·2†	22·0†	19·2†	13·0†	11·6†	..	..	..	..
,, ,, ,,	..	..	..	..	..	..	..	..	..	..	..	26·6‡	21·1‡	18·4‡	12·4‡	..	26·6‡	..	21·1‡	18·4‡	..	..	..	..	..	..

* Steel or chilled iron. † By Tresidder's formula. ‡ By Krupp's formula.

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	75–79.	Jacketed. 1870.		Jacketed.		1875.				1870.					Q.-F. Guns.						
				75	75										16§	16‡	14§	14	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	37	27	14	27 No. 1	10	42†	34	27 No. 1	10	27	24	19 long.	16	14	16·47		13·86		10·00		
Calibre, in inches	14·57	10·79	5·46	10·8	3 94	16·54	13·39	10·8	3·91	10·8	9·45	7·64	6·49	5·46	6·46		5·44		3·94		
Total length, in feet	36·7	17·7	10·3	19·3	9·3	32·5	22	19·3	9·3	17·7	16·21	13·6	12·2	10·3							
Length of Bore, in inches	414·0	194·3	115·0	213·4	104·3	366·0	241·5	213·4	104·3	194·3	179·1	151·0	137·3	115·0							
Length of Bore, in calibres	28·5	18	21	19·7	26	22	18	19·8	26	18·0	19	19·7	19	21	45	30	45	30	60	50	26
Number of Grooves	..	54	28	54	20	84	68	54	20	54	48	28	50	28							
Depth of Grooves, inches	0·079	0·059	0·047	0·059	0·032	0·079	0·059	0·059	0·032	0·059	0·059	0·059	0·039	0·047							
Rifling Twist	7°	4°	4°	4°	7°	7°	4°	4°	7°	4°	4°	4°	7°	4°							
Total weight, in tons	**75·1	22·8	2·6	27·9	1·18	74·8	47·6	27·6	1·18	22·8	15·4	7·9	4·92	2·66	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge: Armour-piercing Projectile* lbs.	463	136·7	..	165·3	..	604·1	304·2	136·7	..	92·6	62·8	33·1	39·7	..	30·2	19·0	16·1	12.8	8·16	8·16	5·07
Weight of Firing Charge: Common Shell "	463	126·8	11·2	145·5	10·1	..	231·5	121·3	7·1	92·6	62·8	33·1	39·7	9·0							
Weight: Armour-piercing Projectile lbs.	1235	476·2	..	476·2	..	1719·6	925·9	476·2	..	476·2	317·5	165·3	99·2	..	99·21		66·14		30·87		
Weight: Common Shell "	1014	396·8	61.7	396·8	30·9	1433·0	771·6	396·8	26·3	396·8	264·6	137·8	99·2	46·3							
Weight: Case Shot "	..	321·9	42·8	321·9	18·7	..	..	321·9	18·7	321·9	211·6	..	68·3	39·7							
Muzzle Velocity, in ft.-sec.	1969	1608	1529	1640	1673	1663	1722	1641	1591	1424	1444	1470	1782	1332	2625	2100	2625	2100	2625	2625	2034
Muzzle Energy: Total, in foot-tons	33210	8515	..	8880	..	17750	19160	8865	..	6695	4592	2477	2183	..	4730	3061	3160	2022	1475	1475	885·5
Muzzle Energy: Per in. circ., foot-tons	725·4	251	..	261·7	..	422	456	261	..	197·3	154·7	103·2	107	..	233·5	150·9	184·9	118·7	119·2	71·6	71 6
Perforation at Muzzle, inches	30·5†	16·2†	..	16·7†	..	26·3†	22·6†	16·7	..	20·53	20·3	10·4	10·8	..	20·0†	14·4†	17·7†	12·7†	14·3†	14·3†	9·8

* Steel or chilled iron.
‡ Models 1881 and 1884 converted guns.
** Made at St. Chamond. The Creusôt gun weighs 71·4 tons.
§ There are three models of the years 1887, 1891 and 1893, of slightly different weight from the above.
† By Tresidder's formula.

GERMAN NAVAL ORDNANCE.

Krupp Steel Breech-loading Guns, designated by calibre.

Designation in centimètres	30·5 jack'd.	28	28	26 long.	26 jack'd.	26 short.	24 long.	24 long.	24 long.	24 short.
Calibre, in inches	12·01	11·02	11·02	10·33	10·33	10·33	9·45	9·45	9·45	9·37
Length — Total, in feet	21·98	36·75	32·15	18·77	18·77	17·06	31·50	27.56	23·63	15·45
Length — Rifled portion, in ins.	181·9	§407·9	§352·8	149·8	150·0	129·3	349·6	302·4	201·6	116·2
Length — Powder Chamber†,,	45·3			44·7	44·4	44·7	..	..	53·5	40·9
Length — Bore, in calibres	18·9	40	35	18·8	18·8	16·8	..	..	26·1	16·8
Number of Grooves	72	..	..	36	48	36	..	..	56	48
Depth of Grooves, in inches	0·079	..	..	0·077	0·079	0·077	..	..	0·059	0·061
Twist, in calibres	45	..	..	50	50	50	..	..	25*	45
Weight — Gun, including Breech Gear, tons	35·4	43·4	43·2	21·7	18·7	17·7	25·4	21·7	18·7	14·6
Weight — Breech Block, in lbs.	2954	..	..	2050	1973	1973	..	..	..	1378
Weight — Armour-piercing projectile,‡ in lbs.	725·3	562·2	562·2	412·3	412·3	412·3	474·0	474·0	474·0	306·4
Weight — Common Shell, in lbs.	725·3	474·0	474·0	357·1	357·1	357·1	474·0	474·0	474·0	261·5
Weight of Bursting Charge — Armour-piercing Shell, in lbs.	7·7	..	..	5·3	5·3	5·3	7·05	7·05	6·6	3·2
Weight of Bursting Charge — Common Shell, in lbs.	19·8	25·4	25·4	14·3	14·3	22·0	16·5	16·5	15·4	15·4
Weight of Firing Charge — Armour-piercing Shell, in lbs.	202·8	352·7	297·6	105·8	105·8	125·7	..	..	152·1	67·2
Weight of Firing Charge — Common Shell, in lbs.	202·8	352·7	297·6	105·8	105·8	125·7	..	..	152.1	50·7
Initial Velocity — Armour-piercing projectile, ft.-sec.	1713	2362	2133	1588	1588	1578	2067	1903	1657	1493
Initial Velocity — Common shell, ft.-sec.	1713	..	..	1641	1641	1654	2067	1903	1657	1391
Muzzle Energy — Total, foot-tons	14,750	21,750	17,740	7211	7211	7119	14050	11910	9024	4736
Muzzle Energy — Per in. circ., ft.-tons	391	628·4	512·4	223	223	220	473·3	401·2	304	161
Perforation at Muzzle, in ins.	20·5	‖ 30·7	‖ 26·3	15·4	15·4	15·3	‖26·8	21·0	18·1	13·0
Ditto by Tresidder's formula	20·8	30·6	26·7	15·1	15·1	15·0	25·3	22·2	18·0	..

Designation in centimètres	21 long.	21 long.	17 long.	15 long.	15 short jack'd.	15 short.	15 short jack'd.	12·5 hoop'd.	10·5 long.	8·7	6¶	8 (Bronze B.L.)
Calibre, in inches	8·24	8·24	6·80	5·87	5·87	5·87	5·87	4·92	3·96	3·43	2·36	3·19
Length — Total, in feet	24·0	20·61	13·94	14·67	10·73	10·73	10·68	9·60	12·08	6·89	4·1	5·15
Length — Rifled portion, in ins.	218·2	176·5	117·1	128·5	93·3	87·1	87·1	85·7	113·6	62·7	44·3	45·9
Length — Powder Chamber†,,	75·3	46·7	31·5	31·1	19·0	25·1	25·1	16·7	19·5	10·7	..	9·73
Length — Bore, in calibres	35·6	27·1	21·9	27·2	19·1	19·1	19·1	20·8	33·6	21·4	..	17·4
Number of Grooves	48	48	30	36	36	36	36	32	32	24	24	12
Depth of Grooves, in inches	0·059	0·059	0·063	0·059	0·061	0·061	0·061	0·059	0·049	0·049	..	0·051
Twist, in calibres	25*	25*	45	25*	45	45	50	40*	25*	40*	..	46
Weight — Gun, including Breech Gear, tons	13·03	12·3	5·51	4·04	3·44	3·44	3·15	1·38	1·15	0·44	0·10	0·23
Weight — Breech Block, in lbs.	831·1	908·3	496·0	390·2	324·1	324·1	324·1	163·1	149·9	86·0	..	55·1
Weight — Armour-piercing projectile,‡ in lbs.	308·6	308·6	117·9	112·4	76·1	76·1	76·1	..	..	..	..	..
Weight — Common Shell, in lbs.	308·6	308·6	112·9	112·4	65·0	65·0	65·0	40·1	39·7	14·9	6·61	8·3
Weight of Bursting Charge — Armour-piercing Shell, in lbs.	5·5	5·5	1·3	1·5	0·8	0·8	0·8	..	..	..	..	..
Weight of Bursting Charge — Common Shell, in lbs.	12·1	12·1	5·1	4·3	4·2	4·2	4·2	2·4	0·9	0·4	..	0·6
Weight of Firing Charge — Armour-piercing Shell, in lbs.	103·6	103·6	30·9	33·1	14·3	17·1	17·1	..	..	..	..	..
Weight of Firing Charge — Common Shell, in lbs.	103·6	103·6	30·9	33·1	14·3	17·1	17·1	8·8	8·8	3·3	0·88	0·9
Initial Velocity — Armour-piercing projectile, ft.-sec.	1739	1657	1608	1624	1463	1463	1463	..	..	..	..	..
Initial Velocity — Common shell, ft.-sec.	1739	1657	1654	1624	1555	1555	1555	1545	1526	1545	1545	1053
Muzzle Energy — Total, foot-tons	6471	5876	2112	2055	1131	1131	1131	..	..	..	..	..
Muzzle Energy — Per in. circ., ft.-tons	250·0	227	98·9	111·5	61·3	61·3	61·3	..	..	..	..	..
Perforation at Muzzle, in ins.	16·4	15·6	10·3	11·0	8·0	8·0	8·0	..	..	..	..	..
Ditto by Tresidder's formula	16·8	15·6	10·2	..	..	..	..	..	..	..	..	..

Note.—There are also quick-firing guns; see Table of Krupp Q.-F. guns. * Maximum twist. † Including taper entrance into bore.
‡ In most cases steel shells. § Length including powder chamber. ‖ Iron by Krupp's formula. ¶ Boat gun for landing and working [illegible]

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.				B.L.	Armstrong Muzzle Loading.							Muzzle Loading. Old Pattern.		Breech Loading.		Armstrong Quick Firing.			
Designation by Calibre, in centimètres	43·1‡ New Pattern.	43·1‡ Early Pattern. 1882.	34·3	12·0	12·0	45·0	27·9 New Pattern.	25·4 No. 1 Long.	25·4 No. 2 Short	25·4 No. 2.	22·8	20·3	16	16	7·5 No. 1.	7·5 No. 2.	15·2†	14·9	12·0*	12·0§
Calibre, in inches	17	17	13·5	4·72	4·72	17·72	11	10	10	10	9	8	6·5	6·5	3	3	6·0	5·87	4·7	4·7
Length — Total, in feet	40·75	39	36·09	8·5	9·25	32·7	14·4	14·4	14	13·8	13·8	10·8	11·8	10·6	5·8	3·3	13·8	13·87	16·2	13·0
Length — Rifled Bore, in inches	346·8	315·7	..	75	88	302	121	120	114	112	106	89	96	87	52	27	126	..		..
Length — Powder Chamber, in inches	84·5	98	..	10·8	22	56 5	24·5	26·0	26·0	14·0	19·5	15·7	21·3	21·3	10·2	7·9	28	..	189	..
Length — Bore, in Calibres	27	26	..	20·2	23·5	20·5	13·2	14·6	14·0	12·6	13·9	13·1	16·8	15·5	20·7	11·7	26	..	40	35
No. of Grooves	82	82	56	37	36	28	9	7	7	8	6	6	6	6	12	12	28	28	22	22
Twist of Rifling, in Calibres	50	50	..	40	42	50	35	40	40	55	45	45	42·5	27·3	48	48	40	40	34·4	..
Total Weight, in tons	104·3	101·5	67·9	1·20	1·38	100	25·0	18·0	18·1	12·1	12·6	6·99	5·12	3·54	0·29	0·095	4	4·2	2·05	1·69
Firing Charge — Armour-piercing projectile, lbs.	900·0	725	630·5	5·5	9·9	551	95·2	77·6		63·9	59·7	37·7	19·8	..	..	..	39 7	26·5	12·0	..
Firing Charge — Common Shell, ,,	600	480	..	5·5	9·9	63·0	66·6	52·9		41·9	37·7	26·7	7·3	7·1	1·9	0·7	26·5	40	12·0	..
Weight — Armour-piercing projectile, ,,	2000	2000	1250	52·0	52·2	2000	540·1	451·9		331·8	315·3	191·8	103·6	..	..	..	80		45·0	36·0
Weight — Common Shell, ,,	2000	2000	1250	31·7	36·8	2000	526·9	399·0		284·4	250·0	180·0	64·6	65·7	9·4	9·4	80	about 80·0	..	36·2
Weight — Shrapnel ,, ,,	2017	2017	1250	37·3	37·37	2180	533·5	399·0		284·4	250·0	180·0	68·3	..	9·4	9·4	80		..	29·8
Weight — Case Shot ,,	..	..	..	32·4	35·9	..	200·1	188·1		135·6	99·6	79·4	33·1	33·1	9·0	9·0	70	..	..	..
Bursting Charge — Armour-piercing projectile, ,,	32	32	17·4	2·31	2·31	32 ?	15·0	12·3		8·4	6·5	3·8	..	..	..	..	1·5	..	..	1·83
Bursting Charge — Common Shell, ,,	60	60	87·1	2·2	2·2	78 ?	26·0	23·8		18·2	18·8	9·7	2·87	2·87	0·31	0·31	5	..	..	3·02
Bursting Charge — Shrapnel ,, ,,	5	5	4·25	0·35	0·35	5 ?	2·2	2·20		1·96	1·80	1·17	0·55	..	0·03	0·03	0·16	..	..	0·35
Muzzle Velocity, in feet	1992	1935	2016	1345	1591	1700	1353	1388		1373	1284	1311	1290	1024	1335	..	1946	..	1786	..
Muzzle Energy — Total, foot-tons	55,030	51,930	35,230	650·4	916·4	40,060	6857	6035		4369	3604	2286	1195	..	..	..	2100	..	995·4	..
Muzzle Energy — Per inch circumference, foot-tons	1035	976·3	830·8	43·9	61·8	753·4	198·5	192·2		139·1	127·6	91·0	58·5	..	..	..	114·1	..	67·1	..
Perforation at Muzzle, inches of iron	33·7	32·8	30·2	6·7	8·1	27·8	14·3	14·1		12·0	11·4	9·6	7·7	..	..	..	**11·4	..	**8·8	..
,, by Tresidder's formula	36·7	35·0	33·0	..	8·3	28·2	..	..		..	..	..	..	..	..	..	11·8	..	9·2	..
Metal employed in structure	St.	I. & St.		St.	St.	Steel tube in Wrought Iron jacket.							I. & St.	Cast I.	Br.	Br.			St.	

St. stands for steel, I. for iron, Br. for Bronze.

* For Piemonte. ** By Krupp's formula. † For Piemonte, Fieramosca, Re Umberto, Ancona, Doria.

‡ There are four types of these bores, viz.: types Lauria, Lepanto, Italia, Valente. § For Duilio, Dandolo, Formidabile. The Piemonte has a 40-calibre gun.

RUSSIAN NAVAL ORDNANCE.

	Obukhoff Steel Breech Loading Hooped Guns.																Steel B.L. Guns.		
Designation by Calibre, in inches	12	12 Long.	12 M. 77.	11 M. 67.	11 Pattern 77.	9	9 [a] M. 67.	9 [b]	8	8	8 M. 67.	6 Long.	6	6·03	6	Long 9-pdr.	4·2 (9-pdr.)	3·43 Long (4-pdr.)	3·43 (4-pdr.)
Calibre in centimètres	30·48	30·48	30·48	27·94	27·94	22·86	22·86	22·86	20·32	20·32	20·32	15·24	15·24	15·32	15·24	10·67	10·67	8·70	8·70
Total Length, in feet	**35	30	20	18·3	20·0	**26·25	15·0	13	**23·33	**20	14·6	**17·5	14	12·2	11·7	6·9	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	165·0	152·0	158·0	..	124·0	..	..	..	128·0	..	118·7	106·0	98·0	61·5	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	38·5	35·0	50·4	..	28·5	..	..	..	23·0	..	30·5	22·4	22·2	10·5	8·0	10·7	..
Length of Bore in calibres, including Powder Chamber	**35	..	17	17	18·9	**35	16·9	..	**35	**30	18·9	**35	24·9	21·3	20	17·1	17·4	21·4	..
Number of Grooves, in inches	..	..	36	36	64	..	32	32	..	..	30	..	..	24	24	24	16	24	12
Depth of Grooves "	..	0·070	0·135	0·135	0·135	..	0·110	0·110	..	..	0·090	..	0·060	0·085	0·070	0·055	0·055	0·050	0·050
Twist of Rifling in calibres	..	..	73·5	70	..	..	60	60	..	..	70	..	*24	60	68	*40	50	40	41
Total Weight, in tons	55·7	50·45	39·9	28·2	28·2	19·44	15·0	12·5	13·64	12·74	9·65	6·26	4·08	4·35	4·03	0·60	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	..	..	665·8	515·9	..	..	249·1	275·6	..	..	172·0	..	90·9	97·6	86·0	..	..	..	..
Weight of Chilled Shell, "	..	731·9	665·8	515·9	562·2	..	275·6	264·7	..	193·1	169·8	..	119·0	86·0	86·0	..	..	..	..
Weight of Common Shell, "	626·4	..	639·3	496·0	520·3	268·2	266·8	266·8	192·3	172·4	172·0	73·35	..	81·6	81·6	27·6	24·2	15·2	12·6
Weight of Case Shot, "	..	..	293·2	216·1	..	..	176·4	176·4	..	..	134·5	..	..	57·3	57·3	27·6	22·3	15·2	11·0
Weight of Firing Charge: Steel Shell, "	..	..	144·4	115·3	..	..	64·2	47·0	..	..	31·5	89·38	..	14·3	18·1	..	..	..	..
Weight of Firing Charge: Chilled Shell, "	..	246·9	144·6	90·6	132·2	..	47·0	47·0	..	72·0	29·3	39·6	37·8	14·3	18·1	..	..	..	..
Weight of Firing Charge: Common Shell, "	..	..	117·3	81·6	132·2	180	42·1	42·1	88·2	72·0	28·4	39·6	..	10·8	14·3	4·5	2·6	3·1	1·3
Muzzle Velocity, in feet	..	1942	1470	1486	1516	2376	1463	1260	1925	1796	1352	2080	‡1739	1206	1463	1225	..	1444	..
Muzzle Energy: Total, foot-tons	..	19140	9974	7903	8960	10500	4095	3035	..	4321	2180	2682	1905	982	1276	..	..	..	..
Muzzle Energy: Per Inch Circumference, foot-tons	..	508·4	264·6	228·8	259·3	371·4	144·7	107·4	..	172·0	86·7	142·3	101·1	51·8	67·74	..	..	..	..
Perforation at Muzzle, in inches	..	23·6	16·7	15·5	16·5	20·2	12·3	10·5	..	13·5	9·5	12·50	10·5	7·2	8·4	..	..	..	..
Ditto by Tresidder's formula	..	25·3	..	..	..	†24·0	..	..	†15·7	†14·2	..	..	†12·2	..	..	..	..	..	..

** It is doubtful if this refers to the total length of gun or of bore. * Maximum of increasing twist. † The weight of the projectile is uncertain.
‡ With pyroxiline. *a* New. *b* Converted. There exist also 15 and 10·7-cm. Krupp guns.

NOTE.—The Russians certainly possess some more powerful pieces than are here shown.

SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 79.				Hontoria, Pattern 83.							
	B.L.				Breech Loading.							
Designation by Calibre	18-cm	16-cm. No. 1.	16-cm No. 2.	16-cm No. 3.	32-cm.	28-cm.	24-cm.	20-cm.	18-cm	16-cm.	14-cm	12 cm.
Calibre, in inches	7·09	6·30	6·30	6·30	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72
Length: Total length, in feet	15·57	13·8	9·50	9·65	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5
Length: Rifled Portion, in inches	141·2	125·6	83·1	..	352·4	309·1	..	..	..	170·6	149·1	126·0
Length: Powder Chamber, in inches	..	31·9	17·3	..	86·8	77·1	..	..	..	49·8	53·9	39·4
Length: Bore, in calibres	..	25	17	..	50	50	30	..	30	35	35	35
No. of Grooves	42	38	3·8	..	80	70	60	50	45	40	35	30
Depth of Grooves, in ins.	0·06	0·06	0·06	..	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04
Twist of Rifling, in cals.		Increasing from 100 to 40.	56	..	From 0 to 30.							
Total Weight, in tons	7·87	5·6	48·0	..	47·3	32·5	20·7	11·5	8·71	6·1	4·1	2·6
Weight: Armourpiercing projectile, in lbs.	135·6	93·7	93·7	..	1041	694·3	438·7	253·5	187·4	130·1	86·0	53·1
Weight: Common Shell, in lbs.	113·8	83·6	83·6	..	879·6	586·4	370·4	213·8	..	112·4	75·0	47·2
Weight: Ring Segment, in lbs.	..	83·8	83·6 / ..	63·9 / 63·9	886·3	590·8	370·4	211·6	..	112·4	75·0	47·6
Firing Charge: Armour-piercing projectile, in lbs.	..	26·5	..	15·4	485·0	352·7	220·5	112·4	94·8	66·1	44·1	28·7
Firing Charge: Other projectiles	..	24·3	..	15·4	463·0	319·7	220·5	..	..	61·7	..	28·7
Muzzle Velocity, in feet	..	1631	1493	..	2034	2034	2034	2034	2034	2054	2001	1988
Muzzle Energy: Total, in ft.-tons	..	1550	1448	..	29850	24030	12580	7271	5374	3806	2386	1511
Muzzle Energy: Per inch circumference, ft.-tons	..	87·4	73·2	..	754·3	694·0	423·9	294·1	241·4	191·1	137·8	101·9
Perforation at Muzz in inches	..	†9·3	8·8	..	†32·9	†28·7	†24·6	†20·5	†18·6	†16·6	†13·9	†11·6
Metal and Construction	St. & Cast Iron.				St. Jacket and Hoops.							

	Armstrong, Pattern 83.				Armstrong.			Krupp.				Converted.			Garcia de Lonia.
					Muzzle Loading.		Pattrn. 81 B.L.	Breech Loading.				Q.F. guns.			Q.F.
Designation by Calibre	15-cm.	12-cm.	8·7-cm	7·5-cm long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	8·7-cm	7·5-cm	14-cm. M. 83	12-cm. M. 83	7-cm. M. 79	10-
Calibre, in inches	6·00	4·72	3·4	2·95	9·00	8·00	6·00	5·87	4·72	3·43	2·95	5·51	4·7	2·76	3·9
Length: Total length, in feet	16·97	13·75	7·9	7·50	13·0	11·0	14·5	17·13	11·81	6·9	6·6	17·4	..	3·71	18·2
Length: Rifled Portion, in inches	158·3	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	57·6	..	..	..	..
Length: Powder Chamber, in inches	31·4	19	13	13	..	..	29·7	..	..	..	..	..	..	..	..
Length: Bore, in calibres	32	33	27	28·7	14	14·75	26·1	35*	30*	24*	25·8*	..	..	..	..
No. of Grooves	28	22	20	18	6	4	28	36	32	24	24	..	..	..	..
Depth of Grooves, in ins.	0·037	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	0·05	0·05	..	..	..	..
Twist of Rifling, in cals.	30	40	30	35	45	40	100 to 40	25	25	40	36	..	..	..	..
Total Weight, in tons	5·0	2·2	0·45	0·35	12·0	9·0	4·0	4·7	2·1	0·44	0·30	4·23	..	0·98	1·67
Weight: Armourpiercing projectile, in lbs.	97·0	39·2	..	..	250·0	180·0	78·3	84·9	43·65	..	..	‡154·3	‡112·4	..	32·4
Weight: Common Shell, in lbs.	92·6	36·4	14·1	11·5	250·0	180·0	73·6	65·5	34·61	14·6	9·48	‡145·5	‡108	7·3	28·2
Weight: Ring Segment, in lbs.	..	38·6	15·4	11·7	..	..	83·6	..	34·61	14·6	9·04	‡145·5	‡108	8·2	28·7 / 17·2
Firing Charge: Armour-piercing projectile, in lbs.	48·5	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	..	..	..	17·2
Firing Charge: Other projectiles	30·0	11·9	4·0	4·0	33·0	21·0	24·9	25·4	..	10·3	10·4	..	..	..	..
Muzzle Velocity, in feet	2070	2000	1625	1709	1339	1339	1929	2001	1887	1539	1552	..	..	1136	..
Muzzle Energy: Total, in ft.-tons	2882	1087	258	233	3105	2239	2018	2357	1076	..	..	..	..	..	..
Muzzle Energy: Per inch circumference, ft.-tons	153·3	73·33	..	..	110·0	89·1	1071	127·8	72·6	..	..	..	..	..	..
Perforation at Muzz in inches	†14·4	†9·3	..	..	10·6	9·6	†11·0	†12·7	†9·7	..	..	..	..	..	..
Metal and Construction	St.				St. and Wt. I.		St.	St.							

18 and 16-cm. Palliser guns and 16 and 13-cm. Parrot guns also exist, and some bronze muzzle loaders. St. stands for Steel; I. for Iron. There is also a 20-cm. (7·87-in.) B.L. Hontoria, Pattern 79, weighing 10·8 tons, firing an armour-piercing projectile weighing 180·8 lbs. with a charge of 61·73 lbs. * Total length, the length of bore not being supplied. † By Krupp's formula. ‡ These weights include the charge and case.

NAVAL ORDNANCE OF SWEDEN AND NORWAY.

Sweden.

	Breech Loaders.			Model 76.		Model 81.		Model 83.		M. 85.	M. 86.	M. 89.	M.L.
Designation by Calibre, in cms.	27	24	17	27	24	27	12	15	8	25	6·5	15	12
Calibre, inches	10·80	9·45	6·58	10·80	9·45	10·80	4·72	6·00	3·31	10·00	2·60	6·0	4·80
Total Length, feet	17·46	14·96	11·27	17·65	16·24	23·10	10·29	13·87	7·37	28·33	3·79	16·98	8·87
Length: Rifled Portion of Bore, ins.	160·8	137·0	107·8	159·2	150·5	191·6	94·5	124·1	71·3	2609	35·0	155·2	83·3
Length: Chamber, "	29·9	25·9	16·5	32·3	28·1	66·2	20·6	31·1	9·7	58·1	4·2	35·2	13·6
Length: Bore in calibres, "	17·2	17·1	18·7	17·8	18·9	23·9	24·0	25·7	24·3	32·9	15·4	32	20·2
Number of Grooves	5	5	5	42	36	45	30	28	24	42	26	28	8
Twist of Rifling	30*	30*	30*	45*	..	40*	30*	30	33*	40*	22*	30	40
Total Weight, tons	23·6	14·4	5·2	23·6	16·4	27·1	1·9	4·2	4·2	29·8	9·4	5·2	1·9
Weight of Armour-piercing Shell in lbs.	476·2†	317·5†	107·1†	476·2†	317·5†	476·2†	..	100·0	..	449·7	..	100	..
Weight of Common Shell, in lbs.	396·8	224·9	97·7	396·8	273·4	396·8	48·5	100·0	14·8	401·2	6·2	100	34·6
Weight of Firing Charge: Armour-piercing Shell, in lbs.	83·8	59·5	22·0	90·4	56·2	206·4	..	35·3	..	242·5	..	54·0	..
Weight of Firing Charge: Common Shell, lbs.	83·8	59·5	22·0	90·4	56·2	145·5	16·0	35·3	3·3	242·5	0·9	..	6·6
Muzzle Velocity, feet.	1322	1312	1365	1378	1365	1788	1640	1663	1542	2100	1148	2067	..
Total foot-tons	5771	3789	1384	6272	4102	10550	..	1918	..	13750	..	2964	..
Muzzle Energy: Per inch Circumference.	170·1	127·6	66·9	184·9	138·2	311·3	..	101·7	..	437·7	..	157·2	..
Muzzle Energy: Perforation through Iron**	13·19	11·4	8·3	13·8	11·9	18·4	..	10·4	..	21·9	..	13·1	..
Muzzle Energy: Ditto by Tresidder's formula	..	..	..	..	..	18·9	..	10·5	..	24·5	..	13·9	..

Norway.

	Krupp, B.L.					Armstrong, M.L.				Palliser, M.L.	
Designation by Calibre, in cms.	26 No. 2.	26 No. 1.	15	12 No. 2.	12 No. 1.	26·7 No. 3.	26·7 No. 2.	26·7 No. 1.	20·2	16·7	15·5
Calibre, inches	10·24	10·24	5·91	4·72	4·72	10·51	10·51	10·51	7·94	6·58	6·11
Total Length, feet	25·59	18·77	12·63	13·78	9·60	16·87	14·65	13·45	10·82	11·58	10·30
Length: Rifled Portion of Bore, ins.	218·9	160·4	112·4	128·6	85·9	138·7	121·0	110·6	85·7	92·4	91·7
Length: Chamber, "	55·4	34·1	22·6	36·8	16·5	36·8	24·0	20·6	18·5	19·3	10·8
Length: Bore in calibres, "	30	19·0	22·8	35	25	16·7	13·8	12·5	13·2	17·0	16·8
Number of Grooves	60	60	36	32	32	8	8	8	6	3	3
Twist of Rifling	∝25	45	45	∝25	40	55	55	55	50	34	34
Total Weight, tons	24·8	21·7	3·9	2·31	1·38	21·7	19·7	18·2	7·4	4·9	3·4
Weight of Armour-piercing Shell in lbs.	606·3	463·0	86·0	57·3	44·1	448·6	393·5	384·9	157·4	109·8	..
Weight of Common Shell, in lbs.	606·3	381·4	69·4	57·3	36·1	316·4	316·4	316·4	153·9	82·7	59·1
Weight of Firing Charge: Armour-piercing Shell, in lbs.	191·8	99·2	22·0	19·8	9·9	110·2	82·7	66·1	29·8	22·0	..
Weight of Firing Charge: Common Shell, lbs.	191·8	81·6	20·9	19·8	9·9	77·2	77·2	48·5	29·8	16·5	7·72
Muzzle Velocity, feet.	1722	1575	1624	1804	1493	1549	1444	1296	1247	1329	1116
Total foot-tons	12460	7966	1573	1290	680	7463	5692	4484	1696	1345	..
Muzzle Energy: Per inch Circumference.	387·4	247·7	84·7	87·1	45·9	226·0	172·4	135·8	68·0	65·1	..
Muzzle Energy: Perforation through Iron**	20·4	16·2	9·5	9·7	7·0	15·5	13·4	11·8	8·3	8·2	..
Muzzle Energy: Ditto by Tresidder's formula	20·9	15·9	9·4	10·5	..	15·1	..	..	..	..	..

Sweden.—The breech-loaders have breech screw-stoppers. The whole of the guns which do not fire shrapnel discharge case-shot.
Norway.—Besides the chilled shell, there are chilled solid shot for the 26·7-cm. and the 20·2-cm. guns, and for all muzzle-loaders case-shot also, besides steel shrapnel for some Krupp guns. * Maximum rate of increasing twist. ** By Fairbairn's formula. † The 16·7 muzzle-loading gun fires steel solid shot.

UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service-charge (not Smokeless Powder.)	Weight of Projectile.	Muzzle Velocity (Service). Brown Powder.	Muzzle Energy. Brown Powder.	Perforation of Wrought Iron at Muzzle.†
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.
4-in. Q.-F., Mark I. . . .	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	33	2000	915	9·8
4-in. Q.-F. Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	33	2000	..	9·8
5-in. Q.-F., Mark I. . . .	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	60	2000	1,660	11·8
5-in. Q.-F. Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	50	2300	1,834	13·2
6-in. B.L.R., Mark I. . . .	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	100	2000	2,773	..
6-in. B.L.R., Mark II. . . .	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	100	2000	..	13·8
6-in. B.L.R., Mark III., of 30 Cals. .	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	100	2000	..	..
6-in. B.L.R., Mark III., of 35 Cals. .	6	5·2	18·8	213·8	177·3	..	34·0	..	100	2080	2,990	14·7
6-in. B.L.R., Mark III., of 40 Cals. .	6	6·0	21·3	243·8	207·3	..	34·0	..	100	2150	3,204	15·4
6-in. Q.-F. Gun	6	6·0	21·3	243·8	204·3	..	37·0	44 to 47	100	2150	3,200	15·4
8-in. B.L.R., Mark I. . . .	8	12·3 / 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	250	2000	6,932	19·0
8-in. B.L.R., Mark II. . . .	8	13·0	21·5	239·9	195·2	..	42·1	..	250	2000	..	19·0
8-in. B.L.R., Mark III., of 35 Cals. .	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	250	2080	7,498	20·1
8-in. B.L.R., Mark III., of 40 Cals. .	8	15·2	28·7	330·5	282·8	..	45·1	..	250	2150	8,011	21·1
10-in. B.L.R., Mark I., of 30 Cals. .	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	500	2000	13,864	24·0
10-in. B.L.R., Mark I., of 35 Cals. .	10	27·1 / 28·2	30·5	343·8	283·7	zero to 1 in 25	57·2	..	500	2060	14,709	25·0
10-in. B.L.R., Mark II., of 30 Cals. .	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	500	2000	13,864	24·0
10-in. B.L.R., Mark II., of 35 Cals. .	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	500	2100	15,285	25·8
12-in. B.L.R., Mark I. . . .	12	45·2	36·8	419·2	343·1	..	74·1	425	850	2100	25,985	30·8
13-in. B.L.R., Mark I. . . .	13	60·5	40·0	454·5	370·5	..	80·9	550	1100	2100	33,627	33·5

NOTE.—The weight of fixed ammunition for Q.F. 4-in. and 5-in. guns is 58 and 95 lbs. respectively.

† By Tresidder's formula.

ELSWICK QUICK-FIRING GUNS.

This Table is supplied by the Manufacturers. The entire Table refers to existing guns.

Diameter of Bore, ins.	Automatic Machine gun. 1·46	1·46	1·46	1·46	1·65	1·85	1·85	2·244	2·244	2·244	2·244	Field and Naval. 3·0	3·0	3·5	4		4		4·7	4·7	4·7	6	6	6	6	† 8		† 8	
do. do. m.m.	Maxim Nordenfelt. 37	Hotchkiss. 37	Hotchkiss. 37	37	Maxim Nordenfelt. 42	Hotchkiss. 47	Maxim Nordenfelt. 47	Maxim Nordenfelt. 57	Maxim Nordenfelt. 57	Hotchkiss. 57	Hotchkiss. 57	76·2	76·2	88 9	100		100		120	120	120	152	152	152	152	203		203	
Length of Bore, cals.	29 9	20	25	45	41·75	40	45·4	42·3	43·5	40	50	28	40	40	40		48·7		40	43·9	48·9	40	40	45	50	40		44·6	
do. Gun, do.	..	22·7	27·8	46·7	46·2	43·6	..	..	..	43·6	53·6	29·2	41·2	41·3	41·3		50		41·1	45	50	41·54	41·54	46·54	51·54	41·63		46·3	
Weight of Gun	lbs. 458	lbs. 73	lbs. 79	lbs. 268	lbs. 379	lbs. 506	lbs. 532	lbs. 700	lbs. 756	lbs. 800	cwts. 10	cwts. 7·5	cwts. 12·0	cwts. 24	cwts. 32		cwts. 36		cwts 42	cwts. 53	cwts. 55	tons. 5·8	tons 6·6	tons. 7	tons. 7·6	tons. 15·5		tons. 19·9	
do. Projectile, lbs.	1·0	1·1	1·1	1·5	2·5	3·3	3·3	6	6	6	6	12·5	12·5	20	25	30	25	30	45	45	45	100	100	100	100	210	250	210	250
do. Charge, lbs.	oz. grs 1·96	ozs. 1·25	ozs. 1·25	ozs. 4·5	..	ozs. 6·8	ozs. 9·5	ozs. 12·5	lb. 1·0	ozs. 7·75	..	ozs. 13 5	lbs. 1·62	lbs. 3·75	lbs. 5	lbs. 5	lbs. 5	lbs. 5	lbs. 5 5	lbs. 8·4	lbs. 8·4	lbs. 15	lbs. 19·5	lbs. 19·5	lbs. 19·5a	lbs. 32	lbs. 32	lbs. 46	lbs. 46
Muzzle Velocity, f.-s.	1800	1319	1460	2300	2010	2002	2300	2300	2400	1940	2592	1585	2200	2420	2540	2325	2650	2430	2150	2570	2630	2220	2500	2570	2642	2242	2068	2650	2480
Velocity at 2,500 Yards, f.-s.	600	570	595	732	896	903	966	1060	1094	966	1172	904	1084	1256	1251	1351	1386	1412	1275	1518	1564	1517	1706	1756	1506	1626	1582	1918	1886
Muzzle Energy, f.-t.	22·5	13·3	18·3	55·0	70·0	91·7	121·0	220	240	156·6	279·5	217·8	419·5	812·2	1118	1124	1217	1228	1442	2061	2158	3417	4334	4580	4840	7319	7413	10226	10662
Energy at 2,500 Yards, f.-t.	..	..	..	..	13·9	18·7	21·3	46·7	49 8	38·8	57·2	70·8	102	219	271	380	333	415	507	719	763	1596	2018	2138	2262	3850	4339	5357	6166
Penetration at Muzzle ‡ ins.	2·4	1·5	1·8	3·5	4·2	4·5	5·6	6·9	7·3	5·3	8·2	4·9	8·0	10·6	12·1	11·5	12·9	12·2	12·1	15·9	16·4	16·2	19·4	20·2	21·0	20·3	20·0	26·4	26·4
Rounds per Minute	250	..	..	25	32	30	30	28	28	25	25	20	20	15	15	15	15	15	10	10	10	7	7	7	7	4	3	4	3

† No cartridge case used.

‡ Worked out by compiler, on Tresidder's formula. § Velocities of 2813 and 2600 f.s. are obtained with the 210 and 250 lb. projectiles, respectively, with Battering charges.

a With special charges and suitable cordite a velocity of 2940 f.s. has been obtained with 100 lb. projectiles. This high velocity, however, is not desirable, except on very rare occasions, on account of the excessive wear of the gun.

Some Results Actually Obtained.

4·7-inch 42 cwt. gun, with single motion breech mechanism, 5 rounds in 22 seconds, at Silloth, at a target, 2 hits, range 1,000 yards; 7 rounds in 25 seconds at drill.

6-inch Admiralty gun, with three-motion breech mechanism, and E.X.E. powder, 10 rounds in 85 seconds, at sea, on board gunboat *Kite*; 18 rounds in 3 minutes, H.M.S. *Royal Arthur*, 14 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards; *18 rounds in 3 minutes, H.M.S. *Blake*, 15 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards.

* Total number of rounds fired from 10 guns in same time 148, of which 110 hit the target.

6-inch 6·6-ton gun, with single motion breech mechanism, 7 rounds in 61 seconds, at Silloth, cordite charge; 4 rounds in 20 seconds, at drill.

8-inch 15·5-ton gun, with single motion breech mechanism, 3 rounds in 28 seconds, at drill; 4 rounds in 62 seconds, on board cruiser *Blanco Encalada*, ammunition supplied from magazine.

13·5-inch 68-ton B.L. gun, with hydraulic breech mechanism, 7 rounds in 12 minutes, H.M.S. *Royal Sovereign*, 6 hits on target, ship steaming 8 knots, range from 1,600 to 2,200 yards; 4 rounds in 6 minutes, H.M.S. *Empress of India*, with an interval between rounds of only 1 minute 27 seconds.

12-inch 46-ton B.L. gun, interval between 2 rounds, 1 minute 19 seconds, H.M.S. *Majestic*; 1 minute 4 seconds, H.M.S. *Cæsar*.

Note.—Although special arrangements and automatic gear are applied to heavy pieces, including the 12-in. gun, the projectiles are too heavy for rapid handling, and no piece exceeding 8 inches calibre is classed under the category of Q.-F. guns at Elswick.

SCHNEIDER - CANET QUICK - FIRE GUNS. Model 1898.

Existing guns, or guns which differ very little from such as have been constructed, are denoted by an asterisk.

This Table is supplied by the Manufacturers.

Calibre, in centimètres	24			21			16			* 15			14			12			
Calibre, in inches	9·45			8·27			6·30			5·91			5·51			4·72			
Length, in calibres	40	45	50	40	45	50	* 45	50	60	* 45	50	60	* 45	50	60	* 45	* 50	60	80
Length, in feet	31·5	35·4	39·4	27·6	31·0	34·4	23·6	26·2	31·5	22·2	24·6	29·5	20·7	23·0	27·6	17·7	19·7	23·6	31·5
Weight of Gun, in tons	20·7	22·5	26·1	13·9	15·1	17·5	7·28	7·73	8·56	5·71	6·10	7·09	4·82	5·17	5·76	2·85	3·15	3·64	6·15
Weight of Projectile, in lbs.	330·7			242·5			101·4			88·2			70·5			46·3			
Muzzle Velocity, in ft.-secs.	2493	2625	2756	2493	2625	2756	2625	2756	2953	2625	2756	2953	2625	2756	2953	2625	2756	2953	3281
Velocity at 2000 mètres, in ft.-secs.	1969	2074	2182	1900	2001	2106	1867	1956	2103	1860	1955	2093	1818	1913	2047	1719	1811	1939	2152
Muzzle Energy, in ft.-tons	14258	15799	17418	9506	10533	11621	4846	5341	6132	4211	4645	5332	3371	3716	4265	2212	2439	2799	3455
Energy at 2000 mètres, in ft.-tons	8887	9860	10917	5517	6141	6783	2451	2716	3111	2116	2339	2679	1616	1790	2051	949	1054	1204	1487
Perforation at muzzle, in ins.†	30·3	33·8	35·4	26·0	28·1	30·2	21·1	22·8	25·3	20·4	22·0	24·5	18·7	20·1	22·3	16·1	17·4	19·3	22·6
" " " ‡	27·9	30·0	32·3	25·5	27·5	29·7	20·5	22·2	24·5	19·7	21·2	23·6	18·2	19·5	21·3	15·9	17·1	19·1	22·4
Perforation at 2000 mètres, in ins.†	21·1	22·8	24·7	17·4	18·5	20·0	12·5	13·5	15·0	12·0	13·0	14·2	10 6	11·5	12·7	8·4	9·1	10·1	11·9

Calibre, in centimètres	10				9			75 mm.			* 65			57			47			37		
Calibre, in inches	3·94				3·50			3·03			2·57			2·24			1·85			1·46		
Length, in calibres	* 45	* 50	* 60	* 80	50	60	80	* 50	60	80	* 60	70	80	* 60	70	* 80	50	60	70	50	60	70
Length, in feet	14·8	16·4	19·7	26·2	14·8	17·7	23·6	12·3	14·8	19·7	12·8	14·9	17·1	11·2	13·1	15·0	..	..	..	..	..	..
Weight of Gun, in tons	1·77	1·89	2·12	3·54	1·38	1·57	2·56	0·79	0·89	1·53	0·64	0·79	0·94	0·59	0·69	0·79	0·24	0·27	0·35	0 13	0·15	0·18
Weight of Projectile, in lbs.	28·7				22·0			13·2			8·82			6·0			3·3			1·8		
Muzzle Velocity, in ft.-secs.	2625	2723	2920	3215	2690	2887	3182	2658	2854	3150	2658	2854	3150	2625	2822	3117	2329	2559	2723	2297	2493	2690
Velocity at 2000 mètres, in ft.-secs.	1640	1703	1831	2011	1640	1755	1939	1496	1668	1775	1394	1496	1650	1033	1083	1171	1017	1086	1129	945	984	1017
Muzzle Energy, in ft.-tons	1369	1474	1696	2055	1107	1275	1549	648	748	910	432	498	607	284	329	401	111	150	178	64	76	88
Energy at 2000 mètres, in ft.-tons	525	576	666	804	411	471	574	205	237	289	119	137	167	44	48	57	24	27	29	11	12	13
Perforation at muzzle, in ins.†	13·7	14·9	16·1	18·7	13·2	14·7	17·1	10·8	12·0	14·0	9·3	10·4	12·1	7·8	8·8	10·2	5·2	5·5	5·7	4·1	4·7	5·3
" " " ‡	13·7	14·5	16·1	18 6	13·4	14·8	17·3	10·9	12·2	14·0	9·6	10·7	12·4	8·3	9·3	10·8	5·7	6·6	7·2	4·6	5·2	5·9
Perforation at 2000 mètres, in ins.†	6·7	7·0	7·9	9·1	5·7	6·8	8·0	4·4	5·0	5·8	3·4	3·9	4·4	1·9	2·0	2·3	1·5	1·6	1·7	1·1	1·1	1·2

† Through wrought iron, apparently calculated by De Marre's formula. ‡ Through wrought iron, by Tresidder's formula.

* The compiler is responsible for the conversion of figures supplied into British units, and for the calculation of the perforations through wrought iron on Krupp's system.

KRUPP QUICK-FIRE GUNS.

Quick-Fire Guns of 40 and 50 calibres in length.

This Table is supplied by Manufacturers, who have indicated existing service-guns with an asterisk.

Calibre, in centimètres	4		4·7		5		5·3		5·7		6		7		7·5		8		8·4		8·7	
Calibre, in inches	* 1·57		* 1·85		* 1·97 *		* 2·09		* 2·24		* 2·36 *		* 2·76		* 2·95		3·15		* 3·31		* 3·43 *	
Total Length, in feet	5·25	6·56	6·17	7·71	6·56	8·20	6·95	8·69	7·48	9·35	7·87	9·84	9·19	11·48	9·84	12·30	10·50	13·12	11·02	13·78	11·42	14·27
Length of Bore, in inches	56·9	72·6	67·5	86·0	72·0	91·7	76·4	97·2	82·1	104·5	86·6	110·2	100·8	128·4	108·3	137·8	115·8	147·2	121·9	154·9	126·4	160·6
Length of Gun, in calibres	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50
Weight of Piece, in lbs.	216·1	238·1	352·7	388·0	423·3	467·4	504·9	555·6	628·3	692·2	731·9	806·9	1164·0	1280·9	1430·8	1576·3	1719·6	1913·6	2010·6	2215·6	2233·3	2460·3
Weight of Piece, in tons	..	..	..	..	..	..	..	..	0·28	0·31	0·33	0·36	0·52	0·57	0·64	0·70	0·77	0·85	0·90	0·99	1·00	1·10
Weight of Steel Projectile, in lbs.	1·94		3·53		3·97		4·50		5·60		6·53		10·36		12·74		15·45		17·90		19·89	
Weight of Charge, in lbs.	0·35		0·57		0·68		0·81		1·01		1·18		1·87		2·30		2·79		3·23		3·59	
Muzzle Velocity, in ft.-secs.	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493	2379	2493
Muzzle Energy, in foot-tons	76	83	123	135	148	162	177	194	219	241	256	281	406	447	500	549	606	666	702	771	780	857
Perforation through Steel,† in ins.	3·31	3·54	3·90	4·17	4·17	4·45	4·49	4·76	4·80	5·12	5·08	5·43	5·98	6·42	6·46	6·89	7·05	7·40	7·28	7·80	7·64	8·11

Calibre, in centimetres	9		10·5		12		13		14		15		16		21		24	
Calibre, in inches	3·54		* 4·13		* 4·72		5·12		5·51		* 5·87 *		6·30		8·24		9.45	
Total Length, in feet	11·81	14·76	13·78	17·22	15·75	19·69	17·06	21·33	18·37	22·97	19·55	24·61	21·00	26·25	* 27·56	34·45	* 31·50	39·37
Length of Bore, in inches	131·1	166·5	153·6	194·9	176·4	223·7	190·2	241·4	205·4	260·5	218·4	279·0	234·5	297·5	307·5	390·2	350·4	444·9
Length of Gun, in calibres	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50	40	50
Weight of Piece, in lbs.	2473·6	2724·9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Piece, in tons	1·10	1·22	1·64	1·87	2·35	2·68	3·12	3·54	3·88	4·41	4·70	5·35	5·88	6·69	16·24	20·18	25·40	31·50
Weight of Steel Projectile, in lbs.	22·05		30·9		44·1		58·4		72·8		88·2		110·2		238·1–308·7	238·1–308·7	352·7–474·0	352·7–474·0
Weight of Charge, in lbs.	3·98		6·83		9·70		12·34		15·43		18·52		23·15		57·32	57·32	85·98	85·98
Muzzle Velocity, in ft.-secs.	2379	2493	2461	2625	2461	2625	2461	2625	2461	2625	2461	2625	2461	2625	2625–2297	2822–2461	2625–2297	2822–2461
Muzzle Energy, in foot-tons	865	950	1293	1475	1851	2107	2453	2791	3055	3476	3703	4213	4628	5266	11376–11293	13146–12962	16853–17340	19478–19905
Perforation through Steel,† in ins.	7·87	8·43	8·90	9·76	9·96	10·91	11·14	12·24	12·05	13·19	12·95	14·17	14·06	15·39	20·08–19·84	22·25–22·01	22·95–23·35	25·39–25·79

† Of medium hardness.

No corrections have been received from Messrs. Krupp for this year.

Table Relating to Conversion of Measures.

Length.

Metric to English.				English to Metric.					
I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards.	mètres. feet.	cms. inches.	yards. mètres.	feet. mètres.	inches. cms.
2000=2187·3	10 =32·809	30·0=11·811	1000=914·38	1000=304·79	10·0 =25·400
300= 328·09	2 = 6·562	·5= ·197	20= 18·29	700=213·36	7·0 =17·780
50= 54·68	0·4= 1·312		6= 5·49	40= 12·19	0·7 = 1·778
4= 4·37				2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English.				English to Metric.					
I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons.	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
	0·3= ·661				
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy=1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01270	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).	of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).	of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).	of kilogrammes per square centimètre in 18·3 tons per square inch (see cols. VI. & VII.).	of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).	of atmospheres in 14·6 tons per square inch (see cols. X. & XI.).
kgs. per sq. cm. = lbs. per sq. in.	kgs. per sq. cm. = tons per sq. in.	lbs. per sq. in. = kgs. per sq. cm.	tons per sq. in. = kgs. per sq. cm.	atmospheres. = tons per sq. inch.	tons per sq. in. = atmospheres.
30 = 426·68	3000 = 19·05	10 = ·7031	10 = 1574·9	3000 = 19·69	10 = 1523·8
2 = 28·45	200 = 1·27	5 = ·3516	8 = 1259·95	200 = 1·31	4 = 609·5
0·1 = 1·42	10 = ·06		0·3 = 47·25	50 = ·33	0·6 = 91·4
				4 = ·03	
32·1 = 456·55	∴ 3210 = 20·38	∴ 15 = 1·0547	∴ 18·3 = 2882·10	∴ 3254 = 21·36	∴ 14·6 = 222.7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).	of mètre-tons in 3592 foot-tons (see cols. III. & IV.).
mètre-tons. = foot-tons.	foot-tons. = mètre-tons.
4000 = 12916·2	3000 = 929·1
300 = 968·72	500 = 154·84
60 = 193·74	90 = 27·87
7 = 22·60	2 = ·62
∴ 4367 = 14101·26	∴ 3592 = 1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versâ*.

1 inch steel = $1\frac{1}{4}$ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

Statement of the First Lord of the Admiralty explanatory of the Navy Estimates for 1898-99.

THE Navy Votes for 1898–99 amount to a net total of £23,778,000, as compared with the original Estimates of £21,838,000 in 1897–98, to which, however, a sum of £500,000 was added in the month of July under special circumstances.

As in the present financial year, so in that for which Estimates are now submitted, the increased number of officers, men, and boys proposed necessitates a further increase in nearly every Vote connected with the *personnel*. The aggregate of these votes exceeds by £446,300 the provision made for the same services in 1897–98.

The Works Vote for the coming year does not differ materially from that of the present year. On the other hand, certain Miscellaneous Votes show an aggregate increase of £47,600. The Ordnance Vote still remains extraordinarily high, viz., at £2,549,200, but it is less than the corresponding Vote for 1897–98 by £125,800, the decrease being due partly to the completion of some heavy orders for guns, and partly to the application of a sum of £90,000 in the present year, under Treasury sanction, out of the savings under other Votes, in relief of Ordnance expenditure in 1898–99.

The Shipbuilding Vote shows an increase of £1,571,000 over the original Estimate of 1897–98. But of this a sum of about £1,400,000 represents provision for expenditure, which, but for the prolonged labour difficulties, would have been met in the present financial year. Further explanation of the effect of these difficulties on the Shipbuilding Programme will be found in a subsequent paragraph.

NUMBERS.

The total number of officers, seamen, boys, coastguard, and Royal Marines voted for the year 1897–98 was 100,050, an increase on the previous year of 6,300.

The additional numbers entered were distributed, as always, over the whole year, each month showing an increase on its predecessor. Any average, therefore, of the numbers borne over the entire year

must be delusive, and a column has been introduced in Vote A. showing the actual number of officers, men, and boys borne on the latest date available before the printing of the Estimates. The number so shown on the 1st January, 1898, was 97,518, but it is now possible to state that on the 1st February the numbers stood at 98,652. It may be regarded as certain that the aggregate numbers voted will be practically obtained by 1st April.

Some slight changes have been made in the form of Vote A., with the object of making the tables clearer.

In accordance with the intention announced during the discussion of the Estimates in the House of Commons last year, the Estimates for the year 1898–99 include provision for a further increase of 6,340. It is made up as follows:—

200	Officers.
2,400	Seamen.
284	Engine-room artificers.
1,700	Stokers.
1,000	Marines.
456	Artisans and miscellaneous.
300	Boys under training.
6,340	

Further increases in the established lists of various classes of officers have been rendered necessary, and Orders in Council have been obtained for these. Among others, the establishment of engineer officers has been raised from 850 to 950, including 50 warrant officers, called "artificer engineers," and that of accountant officers from 500 to 550.

The sea-going training-ship Calliope, to which reference was made last year, has been commissioned as an additional tender to the Northampton for the direct entry of lads; 1,079 lads were entered through these training-ships during the twelve months ended 31st March, 1897, and 808 more in the nine months ended Christmas, 1897.

Steps have been taken to increase the scale of rations laid down for the lads trained in the sea-going training-ships. Hitherto the rations issued to these lads have been on the same scale as the ordinary Naval ration, the rations authorised for the stationary training-ships not being applicable to sea-going ships. Experience has, however, shown that the Naval ration might with advantage be increased in the case of lads taken at an age of rapid growth, and

placed suddenly in an unaccustomed occupation, involving much physical exertion and exposure to weather.

The training-ship Black Prince, stationed at Queenstown, has been fully equipped for service, and the full number of boys that can be accommodated on board are now being regularly instructed.

The number of boys passing out of the training-ships having exceeded the number capable of being sent at once to sea-going ships, it has become necessary to make use of the Agincourt, at Chatham, as a depôt ship for boys discharged from the training-ships until they are drafted to sea. In the course of the coming year arrangements will be made to remove the ship to Portland, which presents great advantages as a training establishment for boys. An assistant inspecting captain whose headquarters will be at Portland has already been appointed.

The composition of the training squadron will undergo a further change in the course of the coming year, when the Active will be replaced by the Raleigh, and the Calypso by the Cleopatra. The Raleigh is a larger vessel, capable of carrying a much greater number of men.

A committee has been appointed to investigate the general question of recruiting, and its report has been received and is under consideration. Many of their minor suggestions have already been adopted, and a very marked improvement has taken place latterly in the entry of engine-room ratings and artisans.

With the view of retaining as many artificers as possible, after they have completed time for pension, an Order in Council has been obtained extending to engine-room and other artisan ratings the privilege of 6*d.* a day "extension pay," allowed in other cases to men who remain in the service after completing time for pension.

A new system of selection of men to be trained as higher gunnery and torpedo ratings, and of the best shots as captains of guns, has been associated with the grant of higher pay to captains of turret and captains of turret guns.

In accordance with the intention indicated last year, a committee, under the presidency of Vice-Admiral Richard E. Tracy, has been for some time inquiring into the training of junior executive officers afloat. Their report has not yet been presented to the Board.

The Royal Marines.

Recruiting for the Marines has been exceptionally active during the past year, when 1000 additional men were to be entered. The total number of recruits raised during the year was 2,665.

The class of recruit taken was fairly up to the average as to physical conditions, age, and stature, notwithstanding the additional numbers necessary to be raised. The standard height for growing lads, under 20, averaged, on entry, a little below 5 ft. 6 in. for Infantry recruits, and fully 5 ft. 7½ in. for Artillery recruits, with a minimum chest girth of 33 in. Very few recruits were received over 20 years of age, but a considerable number entered between 17 and 18 years.

The Estimates for 1898–99 provide for a further increase of 1000 men to the corps.

Towards the end of last year the large accumulation of recruits at the Walmer Training Depôt absorbed the whole of the barrack accommodation there, and it became necessary, without stopping recruiting, to lessen the flow of men in that direction. This was done by forwarding recruits for the Artillery to the division at Eastney, and removing from Walmer the men of that branch already in training there, to complete their course at their own headquarters.

Progress has been made with the new arrangements for musketry practice, consequent upon the introduction of the Lee-Metford rifle. The rifle ranges at Kingsdown are now again available for the recruits at Walmer.

The question of acquiring the necessary land for the Plymouth ranges is now under the consideration of the War Office, and meanwhile the Marines of the Plymouth division are still carrying out their firing at the Army ranges at Browndown.

The necessary provision has been made to meet the cost of improving the ranges at Eastney. The work, however, may be expected to take some considerable time to complete.

Much progress has been made during the year in providing the latest description of guns for the training of the men in Naval gunnery at headquarters. The old muzzle-loading guns have now been superseded, and the drill is entirely on the system of the modern school of Naval armaments. The reports of inspection by the Naval Commanders-in-Chief at each port concerning the course of instruction in Naval gunnery and the qualifications of the men are very satisfactory.

The emoluments of Royal Marine officers afloat have been improved. Senior officers of Marines employed in ships carrying the flags or broad pennants of flag officers or commodores now receive a flag allowance under conditions similar to those which govern the payment of that allowance to Naval officers, while a

money payment in aid of mess will be made to Marine officers of junior rank whenever embarked.

The increased rate of pay sanctioned by lengths of service to majors of Marines is now payable after two instead of three years' seniority in the case of these officers.

An increased scale of ration has been granted to the recruit while under training. It was questionable whether the ordinary ration was sufficient for the proper nourishment of these growing lads during the period of their training at the depôt, and an increase, both of bread and meat, has been made to their daily allowance.

Royal Naval Reserve.

The total number of officers now on the active lists, who have served for 12 months or more in the Navy, or who are now undergoing 12 months' training, is 225, an increase of 42 since last year.

Provision will be made in the coming Estimates for increasing the executive officers' lists by 100.

The Royal Naval Reserve of officers is so popular, and the great Mercantile Marine companies do so much to encourage their officers to join it, that at the present moment, when there is not a vacancy on the lists, there are at the Admiralty 154 applications for entry from eligible candidates.

Instruction was given to a small experimental class of Engineer officers, Royal Naval Reserve, in the Portsmouth Steam Reserve, between the 1st October and 31st December, 1897, to enable them to acquire a knowledge of the working of the engines and boilers used in Her Majesty's ships. Similar classes will be formed this year.

Since the introduction of the new scheme for the entry and training of Royal Naval Reserve men, on the 1st May, 1897, 1,815 men have been enrolled in the new "seamen" class, and the numbers voted for 1897–98 are complete.

It is as yet premature to judge of the probable result of the changes announced last year with the view of putting a larger number of men through a six months' training in the Fleet. At first there appeared to be some hesitation on the part of the men in coming forward for this training, and on inquiry it appeared that some small modifications in the regulations were desirable. Accordingly, the age was reduced from 19 to 18 years, as it was felt that the younger men would adapt themselves more easily to the different life on board a man of war; and for the same reason it was

decided that young men should be allowed to embark direct for six months' training, as soon as they had completed 28 days' drill, instead of first serving for two years in the reserve, provided they were well reported upon. At the completion of their drill, and having passed the required examination, they might be rated "qualified" seamen at the age of 20.

The number for which it is considered that accommodation can advantageously be found on board ships at one time is 600. At the present time 543 are embarked.

The drill ships and batteries have now been supplied with the Lee-Metford magazine rifle, and the Royal Naval Reserve are being instructed in the use of that weapon.

647 seamen and 125 firemen of the reserve were embarked for service during the 1897 Naval Review and subsequent cruise in 35 different ships, and were well reported upon, especially the firemen.

It is proposed to raise the number of men voted by 500 firemen, making a total of 22,000 seamen, 3,500 firemen, and 300 boys.

Mobilisation.

The number of vessels and torpedo-boats taking part in the manœuvres was 165, manned by 37,619 officers and men, as compared with 105, manned by 20,500 officers and men in the manœuvres of 1896.

The whole of these ships went to sea practically fully officered and manned. The deficiencies, which were slight, were mainly among the Medical and Accountant officers, and in the Carpenter ratings. The total number of Coastguard men embarked was 1788, and of the Royal Naval Reserve, officers and men, 819.

The system of relieving the older ships on foreign stations by larger modern vessels of greater speed, and carrying more powerful armaments, continues to be carried out. Modern battleships are also relieving the older vessels as coastguard and portguard ships both at home and abroad. An additional portguard ship (Hotspur) has been established at Bermuda, and the Monarch has been stationed at the Cape to replace the Penelope.

The senior officer in charge of the squadron on the south-east coast of America has been given the rank of commodore, second class, and a larger cruiser has been sent to relieve the present senior officer's ship.

NEW CONSTRUCTION.

Expenditure on new construction has been most seriously affected by the prolonged labour difficulties, which lasted from July to the beginning of February. Payments to contractors have been so disarranged by the suspension of work that even at the present date it is not easy to foresee the exact amount by which the anticipated expenditure on new construction will fall short. The best estimate which can be made at the present time is that it will amount to about £2,270,000. Of this sum, £1,400,000, as stated before, will fall on 1898–99, the remainder on 1899–1900 and 1900–01.

In the case of many contracts spreading over several years, the postponement of the work for six or seven months throws forward all the instalments to later dates than were originally anticipated, except so far as arrears can be made up.

The difficulties in question have affected propelling and auxiliary machinery, gun mountings, armour, and other important classes of materials.

The indirect effects of the labour difficulties have, of course, not been confined to contract ships.

In the dockyards the delays on the part of contractors in the completion and delivery of machinery, armour, &c., have involved considerable difficulty in carrying on the work of construction in the manner essential to the earliest possible dates of completion of ships. Delays have occurred also in the steam and gunnery trials of certain ships which otherwise would have been completed and ready for service.

On the contract side of the shipbuilding programme the difficulties have been much greater, not merely in the form of arrested progress on work directly affected by the labour dispute, but also in the retardation of work on the hulls and fittings of ships. A less number of men has consequently been engaged on these classes of work than would otherwise have been employed; and a considerable number of ships, which (in the ordinary course) would have been delivered and completed during 1897–98, are still in the hands of contractors.

Details of these delays are given hereafter, but, broadly speaking, it may be stated that the actual dates of completion for service of many important ships will be deferred by an interval practically equal to the time over which the dispute has extended.

Shipbuilding in 1897–98.

Battleships.

It was anticipated in the First Lord's statement of last year that the Cæsar, Illustrious, and Hannibal would be completed towards the autumn of 1897.

The Cæsar was completed rather later than the time anticipated, her trials being delayed. She is now in commission. The completion of the Illustrious was greatly delayed by the postponement of her steam trials in consequence of the labour difficulties; and subsequently by the fact that the earlier steam trials were not satisfactory.

It is now anticipated that both the Illustrious and the Hannibal will be practically completed at the close of the financial year.

Six battleships of the Canopus class have been in progress in 1897–98. Three of these are building in the dockyards, and all of them have been seriously affected by the delays above-mentioned in contract portions of the work.

The Canopus was launched in October last, and the dockyard expenditure and progress have been nearly in accordance with the programme, but work on propelling and other machinery, gun mountings, and armour is much in arrear.

Work on the hulls of the Ocean and Goliath has been hampered by the non-delivery of important castings by contractors. The date of launch of the Goliath has, in consequence, been postponed for several months; but while the order in which the work has been performed has necessarily been altered, good progress has been made in other directions, and this ship, as well as the Ocean, will be in a very advanced condition when launched. Their final dates of completion will be dependent on the contract portions of the work.

The Albion and Glory are building in private yards. Satisfactory progress has been made on the hulls, although work on the engineering side has been seriously delayed.

Provision was made in the Estimates for 1897–98 for the commencement of four new battleships of the first class. One of them, the Vengeance, which is building by contract, is of the Canopus class; the other three, building in the dockyards, are of the type now called the Formidable class. Particulars of the design of this class have been communicated to Parliament. They are, practically, improved Majestics.

As these vessels are to be armed with new and improved patterns of 12-in. and 6-in. quick-firing guns, a longer time than was anticipated has been occupied in settling the design and completing the preliminary trials of the guns. Consequently the completion of the designs of the ships and the commencement of the work of construction have been deferred to a somewhat later date than was contemplated.

The dockyards are now in possession of the necessary information, and the work of providing the materials and carrying out the preliminary stages of construction is in hand.

First-class Cruisers.

The Diadem is the only vessel of her class which has been delivered by contractors during 1897–98. She has passed through her steam trials satisfactorily, and will shortly be completed for service.

The Europa and Niobe would, apart from the labour difficulty, have been delivered practically at the same time as the Diadem. It is now anticipated that they will be delivered early in the next financial year.

The Andromeda and Spartiate, at Pembroke, have been satisfactorily advanced, and the former will leave that yard for completion at Portsmouth in the autumn.

Three other vessels of the class building by contract have been considerably delayed. In the case of the Argonaut, which was launched in January, 1898, two serious fires in the works of the contractors greatly retarded the work. The sister vessels, Ariadne and Amphitrite, have been delayed in consequence of the labour difficulty in the engineering trade, although the contractors have done all in their power to advance the work on the hulls.

The commencement of the four armoured cruisers, of the Cressy class, which were described to the House in July last, has, as in the case of the Formidable class, been delayed by the fact that the introduction and trial of the new types of 9·2-in. and 6-in. quick-firing guns, with which these vessels are to be armed, involved a considerably longer period than was anticipated, and consequently retarded the completion of the design.

Tenders have now been invited for these vessels, and it is anticipated that the orders will be placed by the end of the present financial year.

Second-class Cruisers.

In consequence of the labour difficulties only one of the four vessels of the Arrogant class has been completed for service. The Arrogant has passed successfully through her steam, gunnery, and steering trials, and is now attached to the Channel Squadron. The other three vessels are far advanced, and it is anticipated that they will be completed at an early date.

The three new vessels of the modified Talbot class (Hermes, Highflyer, and Hyacinth) are building by contract. Their progress, too, has been considerably retarded.

Third-class Cruisers.

Five contract-built vessels of this class are still in the hands of the contractors. Apart from delays consequent on the labour difficulty, they would have been completed for service, and several of them have been in commission. Now that work has been resumed, it is anticipated that they will be delivered in the course of a few months.

The completion of the two most advanced dockyard ships of this class has also been affected by the same circumstances, but considerable progress has been made on the hulls of the three vessels of this class commenced in the dockyards in this financial year.

Sloops and Gunboats.

The two sloops (Condor and Rosario) building at Sheerness Dockyard have been advanced as intended.

The four twin-screw gunboats for special service, building by contract, have been commenced, but not advanced so far as was proposed.

Torpedo-boat Destroyers.

Of the 42 earlier torpedo-boat destroyers of 26 to 27 knots speed, all but five have been delivered. The difficulties which have delayed the completion of these vessels have now been practically surmounted, and it is anticipated that they will be all delivered and ready for service in the course of the coming financial year.

Forty-five torpedo-boat destroyers, with contract speed of 30 knots, were in construction at the beginning of 1897–98, and five more vessels of similar character have been ordered during the

year, making fifty vessels in this group. The labour difficulty has been the cause of very serious delay. Twenty of them have successfully passed all their official trials. Five others are now undergoing their trials, being otherwise practically completed. The completion and delivery of the remaining vessels of the class should take place at intervals during the coming financial year.

Three experimental destroyers, of 32 to 33 knots speed, were ordered before the beginning of the financial year. Their progress has been seriously hindered by the dispute in the engineering trade. On two of them substantial progress has been made.

A further order has just been placed for an experimental vessel in which the steam turbine will be substituted for the ordinary reciprocating type of machinery, in order to test the applicability of the system to torpedo vessels of exceptionally high speed.

Shallow Draught Steamers.

This flotilla of light-draught gunboats, eight in number, particulars of which were stated to the House, will all be completed by the close of the financial year. Two of them are already on service in the Niger.

They are in many respects of novel type. The stipulated conditions for draught and speed were satisfactorily fulfilled by the contractors.

New Royal Yacht.

This vessel has been commenced at Pembroke, and substantial progress will have been made upon her by the close of the financial year. It is proposed to make her ready for launching early in 1899.

NEW SHIPBUILDING PROGRAMME.

In the coming financial year it is proposed to commence—

3 Battleships.
4 Armoured cruisers.
4 Sloops.

Of these, the three battleships and two sloops will be built in the dockyards, and the remainder by contract in private yards.

The number of men in the dockyards will be retained at their full strength, but the work already in hand will render it improbable that slips for all three battleships will be available till the beginning of 1899–1900. But as it is essential that rapid progress should be made with these ships at the earliest date when they can be commenced, the preparations to build, and the earlier stages of construction, are provided for in 1898–99.

Summary of New Construction.

From the preceding statement it will be seen that, including new orders, the following vessels will be under construction or completing during 1898–99 :—

12 Battleships.
16 First-class cruisers.
6 Second-class cruisers.
10 Third-class cruisers.
6 Sloops.
4 Twin-screw gunboats.
41 Torpedo-boat destroyers.
Royal yacht.

Reconstruction and Repairs.

The following large repairs have been carried out during 1897–98 at the Home dockyards :—

Royal Arthur.	Spartan.
Barham.	Ringdove.
Seagull.	Barracouta.
Mercury.	Swallow.
Porpoise.	Racoon.
Mohawk.	Hotspur.
Arethusa.	Dolphin.
Rodney.	Raleigh.
Æolus.	Flora.
Bonaventure.	Lynx.
Magicienne.	Thrasher.

Progress has also been made on the following ships :—

Bellona.	Dreadnought.
Crescent.	Cambrian.
Marathon.	Salamander.
Tartar.	Sheldrake.

The work in the Royal dockyards continues to be carried out in a satisfactory and economical manner. The work at the Naval yards abroad remains very heavy, owing to the large number of ships in commission and the re-commissioning repairs rendered necessary by the non-delivery, on account of the engineering dispute, of new ships intended as reliefs.

The details of the repairs and refits to be carried out in 1898–99 appear in Appendix to the Estimates. The principal work to be undertaken is the advancement in the work of fitting new boilers in the Dreadnought and in re-boilering the Blanche, Sheldrake, and Bellona.

Machinery and Boilers.

Since last year's statement was issued, the following ships, which it was stated would probably be tried before 1st April, 1897, successfully passed through their trials before that date. The first-class battleships Mars and Jupiter, the second-class cruisers Doris and Isis, and four torpedo-boat destroyers.

The following vessels have satisfactorily completed their contract steam trials during the present financial year:—battleships Cæsar and Hannibal, first-class cruiser Diadem, and second-class cruiser Arrogant, and 20 torpedo-boat destroyers of 30 knots speed.

The trials of the first-class battleship Illustrious, and the second-class cruiser Furious, will probably be completed before the end of the current financial year.

The machinery of many more vessels would have reached the trial stage during this financial year had it not been for the delay caused by the labour difficulties.

The trials of the Diadem are of interest, as she is the first ship with Belleville water-tube boilers which have been fitted with economisers, and the results obtained are very satisfactory in regard to economy of fuel, efficiency of combustion, ease of working, and of maintaining the specified powers.

The experiments to be made with different types of water-tube boilers in torpedo gunboats have not as yet been carried out, but it is expected that the Salamander, with Mumford boilers, and Seagull, with Niclausse boilers, will be tried at an early date.

The Powerful has been commissioned and is now on the China station. Her boilers have fully answered the expectations, but trouble has been experienced with her machinery. It is anticipated

that, when more experience has been gained on service of the working of her propelling and auxiliary machinery, the present difficulties will be overcome.

Armour.

During the last twelve months several important experiments have been made on armour plates of improved quality, and contracts have been arranged on the basis of these experiments.

The output of armour has been seriously reduced in consequence of the dispute in the engineering trade. In addition, the introduction of new qualities of armour has necessitated considerable alterations and additions of plant, which have temporarily diminished the output. These difficulties are gradually disappearing, and in the coming year it is anticipated that much larger deliveries will be made.

Naval Ordnance.

The manufacture of guns is proceeding satisfactorily, and the production is keeping pace with the requirements of the Fleet.

The conversion of 6-in. and 4-in. breech-loading guns to quick-firers will be completed at an early date in the financial year 1898–99.

A new and more powerful 6-in. Q.-F. gun than the present one has, after exhaustive trials, been adopted, and its manufacture for future ships is proceeding. For the first time since the introduction of Q.-F. guns it has been found possible to produce a gun which, whilst able to fire with safety and rapidity, does not require the expensive and heavy brass cartridge case which has hitherto been thought indispensable. The adoption of this plan will cause a great saving in the cost and weight of ammunition, and of the space required to stow it.

The heavy guns for the main armaments of the new battleships and first-class cruisers of the 1897–98 and future building programmes, will be much more powerful weapons than the present corresponding guns afloat. Their manufacture has been commenced.

The supply of cordite charges to the Fleet is proceeding satisfactorily, and it will be further extended as the present stocks of gunpowder are reduced.

The equipment of the Fleet with the Lee-Metford magazine rifle will be completed by March 31st, and the difficulties in finding ranges suitable for this new arm are being gradually overcome.

During the year the withdrawal from the service of some of the earlier types of Whitehead torpedoes has been carried out, the torpedoes withdrawn having been replaced by others of more modern date.

Gun Mountings.

The manufacture of gun mountings of all types is proceeding satisfactorily. Great attention has been devoted to the development of all appliances which experience has shown will improve the rapidity of fire, and at the same time simplify, as far as possible, the machinery necessary for the working of modern heavy guns of great power.

There is every reason to believe that when the heavy gun mountings to the new designs are completed a great improvement will have been achieved.

For the new 6-in. Q.-F. gun, designs of mountings are still under consideration, in which various improvements on existing types have been introduced. The designs will be settled very shortly, and manufacture will proceed at once.

NEW WORKS.

New Works in the Estimates.

The principal new works for which provision is made in the Estimates for 1898–99 are—

At Chatham, a new coal depôt, to facilitate and expedite coaling, and the reconstruction of the Foundry.

At Portsmouth, a new saw mill and an extension of jetties, to provide additional berthing accommodation.

At Malta, the conversion of the old boiler shop into an iron foundry, and the re-arrangement of the steam branch workshops, to meet the present and future requirements of the yard.

Provision is made for new or additional hospital accommodation at Plymouth, Portland, Walmer, Malta, and the Cape of Good Hope, to meet the urgent needs of the Fleet.

Works in Progress.

At Chatham, the lengthening of No. 5 dock, to take ships of the Diadem class, is expected to be completed about September. The improvement of the water supply has been begun.

At Portsmouth, the new boiler shop is making good progress.

At Devonport, the enlargement of No. 2 dock, to accommodate battleships, and extension of No. 1 jetty, should be finished during this financial year. A contract has been made for the new mould loft.

At Haulbowline, the establishment of a recreation ground for the boys of the Black Prince is being proceeded with.

At Bermuda, good progress has been made with the dredging.

Surveys, &c., for docks are in progress at Bermuda, Jamaica, Mauritius, and the Cape.

Premises have been leased at the West India Docks for the reception of Naval stores hitherto kept at Deptford. The accommodation thus set free at the latter place is urgently needed for the extension of the Victualling Yard.

The improvement of the water supply at Jamaica and the Cape of Good Hope will be completed this year.

Progress under the Naval Works Acts.

(*a*) *Inclosure and Defence of Harbours.*

Gibraltar.—On the Admiralty Mole Extension a length of about 1000 feet has been brought up above low-water level. Beyond this point about 200,000 cubic yards of rubble have been deposited on the line of the Mole. About 450 feet of the quay wall on the harbour side of the Mole has been finished, and another 450 feet is in hand.

It was originally intended to construct the last 1750 feet of this Mole of concrete blocks to the same section as the Detached Mole, but there has been such serious delay in the delivery of the block-making machinery that it has now been decided to carry the rubble mound section the whole length of the extension. The work as thus modified will, it is expected, be brought up to low-water level by December 31st next.

The rubble mound of the Detached Mole is completed, and the manufacture of concrete blocks for it has been begun. The two titan cranes required for block setting are to be erected ready for use at Gibraltar on September 30th, 1898, and January 31st, 1899, by which time it is hoped that there will be sufficient seasoned blocks to keep them steadily at work.

Over 600,000 tons of material have already been dredged from the harbour. Two dredgers are at work.

Gibraltar, Commercial Mole.—The wharf wall on the north-east of the old Mole is in progress, and about 20,000 cubic yards of filling have been deposited on the reclamation. The rubble base of the outer arm of the new Mole is in progress.

Portland.—About 400,000 tons of stone have been deposited on the line of the new breakwater. A contract has been made for the completion of the work, the whole of which is to be brought up to low-water level not later than September 21st, 1899.

Dover.—The contract for this work was signed in November last. The extension of the Admiralty Pier is to be completed in eight years, and the rest of the work in ten years from the acceptance of the tender.

(*b*) *Adapting Naval Ports to present needs of Fleet.*

Deepening harbours and approaches.

Chatham.—The work was finished last year.

Portsmouth.—Fountain Lake has been dredged to 25 feet at low water. Six berths for battleships and one for cruisers have been completed.

Devonport.—The dredging in the Sound has been finished. The removal of the Vanguard and Cremyll shoals and the Rubble Bank is being carried out by contract, and about 600,000 tons of material have been dredged. This work will be completed within the financial year 1898–99.

Keyham Dockyard Extension.—The cofferdams for excluding the water are nearly completed.

The excavation for the east wall of the Closed Basin has been taken out to full depth for a length of 825 feet from south end, and to a depth of 23 feet below coping for a length of 300 feet from north end. The wall has been constructed for a length of 520 feet to level of 4 feet below coping, except where a space has been left for foundation of the sheers, and a further length of 100 feet is built to level of 23 feet below coping, and a length of 205 feet to level of 31 feet below coping.

In Dock No. 4, a commencement has been made in setting the masonry for the lower altars in the east wall, and a length of 400 feet of concrete foundation has been placed in the west wall. Good progress has been made with the excavation for the wall across the head of the dock.

The pump wells and the culverts are in progress.

Portsmouth Docks.—The two new docks have been completed.

Gibraltar Dockyard Extension.—Twelve acres of the reclamation have been completed. The tunnel has been driven for a length of about 860 yards, being about two-thirds of the total length.

The deepening of the Auxiliary Boat Camber is in progress, and about 10,000 cubic yards of rubble have been deposited in the embankment.

The excavation of the new Mole Parade and the retaining walls have been completed. The excavation at the head of No. 1 Dock is in progress.

Hong Kong Dockyard Extension.—Plans are in hand, but the negotiations for the acquisition of the necessary land have been unexpectedly difficult and prolonged, and the Admiralty are not yet in possession of the land to be acquired from the War Office and private owners.

Colombo Dock.—This dock is to be constructed by the Colonial Government, with whom the necessary agreements have been made.

The works at Pembroke and Haulbowline, and the widening of the caisson at Portsmouth are in hand.

(c) *Naval Barracks, &c.*

Chatham Naval Barracks.—The War Office are proceeding with the reconstruction of the Brennan Torpedo Factory, which occupies part of the site of two of the new barrack blocks. The cost of this work will be borne by the Naval Works Loan. The contract for the new barracks has been signed and work has been commenced.

Sheerness Naval Barracks.—The plans have been completed.

Portsmouth Naval Barracks.—The War Office have transferred the Anglesea Barracks, but payment has not yet been made for them. Plans for the new barracks have been approved.

Keyham Naval Barracks.—The contract for this work has been made.

Chatham Naval Hospital.—Plans have been approved and tenders will shortly be invited.

Walmer Marine Depôt,
Keyham Engineers' College. } These works are completed.

Dartmouth College.—Plans prepared by Mr. Aston Webb are now under consideration, but the Admiralty have not yet obtained possession of the land.

Magazines.—Work is steadily proceeding at Woolwich, Portsmouth, Devonport, Gibraltar, and Malta.

Plans for the hospital extensions at Haslar and Haulbowline have been approved.

The expenditure during the year has fallen so far short of the large sum granted by Parliament that sufficient funds are available for carrying on the works during the financial year 1898–99. It is, therefore, not proposed to introduce a new Naval Works Bill this session.

GEORGE J. GOSCHEN.

3rd March, 1898.

Abstract of Navy Estimates for 1898-99.

Votes.		Estimates, 1898–99. Gross Estimate.	Estimates, 1898–99. Appropriations in Aid.	1898–99. Net Estimate.	Estimates, 1897–98. (a) (Including Additional Estimate). Gross Estimate.	Estimates, 1897–98. Appropriations in Aid.	Estimates, 1897–98. Net Estimate.	Difference on Net Estimates. Increase.	Difference on Net Estimates. Decrease.	Votes.
	I.—NUMBERS.			Total Numbers.			Total Numbers.	Numbers.	Numbers.	
A.	Total Number of Officers, Seamen, Boys, Coast Guard, and Royal Marines	....	....	106,390	....	....	100,050	6,340	....	A.
	II.—EFFECTIVE SERVICES.	£	£	£	£	£	£	£	£	
1	Wages, &c., of Officers, Seamen and Boys, Coast Guard, and Royal Marines	5,105,185	117,185	4,988,000	4,808,585	112,585	4,696,000	292,000	....	1
2	Victualling and Clothing for the Navy	1,921,325	429,625	1,491,700	1,806,660	422,060	1,384,600	107,100	....	2
3	Medical Establishments and Services	190,900	23,900	167,000	185,776	24,376	161,400	5,600	....	3
4	Martial Law	11,427	27	11,400	10,675	75	10,600	800	....	4
5	Educational Services	116,027	29,427	86,600	114,915	29,315	85,600	1,000	....	5
6	Scientific Services	79,629	12,429	67,200	78,444	11,744	66,700	500	....	6
7	Royal Naval Reserves	257,113	113	257,000	250,007	107	249,900	7,100	....	7
8	Shipbuilding, Repairs, Maintenance, &c.:									8
	Section I.—Personnel	2,230,915	12,915	2,218,000	2,008,915 (a) 130,000	12,915	1,996,000 130,000	92,000	....	Sec. I.
	Section II.—Matériel	3,132,000	161,000	2,971,000	2,187,000 (a) 40,000	163,000	2,024,000 40,000	907,000	....	Sec. II.
	Section III.—Contract Work	5,649,440	37,440	5,612,000	5,248,100 (a) 230,000	38,100	5,210,000 230,000	172,000	....	Sec. III.
9	Naval Armaments	2,584,700	35,500	2,549,200	2,709,687 (a) 100,000	34,687	2,675,000 100,000	....	225,800	9
10	Works, Buildings, and Repairs at Home and Abroad	657,100	7,000	650,100	655,300	6,500	648,800	1,300	....	10
11	Miscellaneous Effective Services	243,127	10,227	232,900	205,077	9,677	195,400	37,500	....	11
12	Admiralty Office	256,700	9,000	247,700	251,300	7,700	243,600	4,100	....	12
	Total Effective Services . . . £	22,435,588	885,788	21,549,800	20,520,441 (a) 500,000	872,841	19,647,600 500,000	1,628,000	225,800	
	III.—NON-EFFECTIVE SERVICES.									
13	Half-Pay, Reserved, and Retired Pay	764,803	12,303	752,500	761,771	12,271	749,500	3,000	....	13
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,104,808	21,908	1,082,900	1,075,176	21,976	1,053,200	29,700	....	14
15	Civil Pensions and Gratuities	333,323	423	332,900	327,785	385	327,400	5,500	....	15
	Total Non-Effective Services . . £	2,202,934	34,634	2,168,300	2,164,732	34,632	2,130,100	38,200	....	
	IV.—EXTRA ESTIMATE FOR SERVICES IN CONNECTION WITH THE COLONIES.									
16	Additional Naval Force for Service in Australasian Waters—Annuity payable under	95,300	35,000	60,300	95,300	35,000	60,300	....	....	16
	GRAND TOTAL . . . £	24,733,822	955,422	23,778,400	22,780,473 (a) 500,000	942,473	21,838,000 500,000	1,666,200	225,800	
							Net Increase	£1,440,400		

(a) Additional estimate, 21 July, 1897 (Parliamentary Paper, No. 329).

STATEMENT showing the Actual and Estimated EXPENDITURE for NAVAL SERVICES for the Three Years ending the 31st March, 1899.

		£	s.	d.
1896–97	Estimated Expenditure (after deducting Appropriations in Aid)	21,823,000	0	0
	Supplementary Estimate (22nd February, 1897)	507,000	0	0
		22,330,000	0	0
	Net Expenditure, as per Final Account	22,271,901	16	0
	Net Surplus (Expenditure less than Estimate)	£58,098	4	0
1897–98	Estimated Expenditure (after deducting Appropriations in Aid)	£21,838,000	0	0
	Additional Estimate (21st July, 1897)	£500,000	0	0
		£22,338,000	0	0
1898–99	Estimated Expenditure (after deducting Appropriations in Aid)	£23,778,400	0	0

STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1897–98 and those for 1898–99.

		£
INCREASES.		
Wages, &c., of Officers, Seamen, and Marines		295,185
Victualling and Clothing		95,263
Medical Establishments and Services		4,202
Martial Law		506
Educational Services		1,000
Scientific Services		500
Royal Naval Reserves		7,100
Wages, &c., of Men in Dockyards		89,182
Naval Stores		909,990
Hulls of Ships, etc. (Contract)		156,285
Machinery for Ships and Shore Establishments (Contract)		34,897
Projectiles, Ammunition, Torpedoes, and Guncotton		118,430
Wages of Artificers employed in Naval Ordnance Establishments		5,515
Inspection, &c., of Naval Ordnance Stores		4,000
Works, Buildings, and Repairs		1,300
Miscellaneous Effective Services (Passage Money, &c.)		37,500
Non-Effective Services		38,200
Miscellaneous Items		20,063
DECREASES.		1,819,118
	£	
Increase in amount of Receipts arising from the Sale of unserviceable Naval Stores and old Machinery	5,000	
Gun Mountings and Air-compressing Machinery (Contract)	16,682	
Repairs, &c., of Ships and Machinery (Contract)	4,500	
Guns	262,440	
Small Arms, Maintenance of Vessels, and Miscellaneous Stores, &c.	90,096	
		378,718
Net Increase		£ 1,440,400

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

———		1898–99.	1897–98.
NAVY ESTIMATES:		£	£
Estimated Expenditure (after deducting Appropriations in Aid) . .		23,778,400	21,838,000 (a) 500,000
CIVIL SERVICE ESTIMATES:			
Estimated Expenditure under—			
Class I. Vote 4.—Admiralty, Extension of Buildings (Net) . .		—	*40,000*
" I. " 8.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c. .	4,250		
Rents, Insurance, Tithes, &c. . .	8,800		
Fuel, Light, Water, &c. . . .	3,850		
Furniture	1,800		
	———	18,700	18,700
Class I. Vote 10.—Surveys of the United Kingdom		150	150
" I. " 13.—Rates on Government Property		84,800	75,800
" I. " 14.—Public Buildings, Ireland:			
Coast Guard, viz.:	£		
Purchase of Sites . . .	200		
New Works and Alterations, including Naval Reserve Stations . .	9,149		
Maintenance and Supplies . .	5,970		
Furniture, Fittings, &c. . .	11		
	———		
	£15,350		
Naval Reserve, viz.:			
Maintenance and Supplies . .	510		
	———	15,860	16,405
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		3,150	3,600
Class II. Vote 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts	6,600		
Expense and Manufacturing Accounts	4,462		
Store Accounts	5,340		
	———	16,402	17,468
Class II. Vote 23.—Stationery and Printing		73,000	76,000
" III. " 1.—Law Charges, England (Net)		3,270	3,305
" III. " 8.—Prisons, England and the Colonies:			
Maintenance of Naval Prisoners . . .		3,262	2,440
" III. " 14.—Prisons, Scotland		109	82
" III. " 21.—Prisons, Ireland		59	44
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs.—Payment of Coast Guard District Ships, and Services connected with Seamen's Allotments . . .		157	1,012
Vote 2.—Inland Revenue.—Analysis of Food, &c., and Services connected with Seamen's Allotments		110	410
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£ 15,137		
Vote 5.—Post Office Telegraphs.—Official Telegrams and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks)	13,761		
	———	28,898	28,415
Total . . . . . £		24,026,327	22,121,831 (a) 500,000

(a) Additional Estimates, 21st July 1897.

Note.—In addition to the Services shown above, an annuity of £16,243 18*s.* is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

VOTE (A.)

NUMBERS of Officers, Seamen, Boys, and Royal Marines, Borne on the Books of Her Majesty's Ships, and at the Royal Marine Divisions.

One Hundred and Six Thousand Three Hundred and Ninety.

I.—Sea Service.

Under which Vote Provided.	Ranks, &c.	Numbers, all Ranks. 1898–99.		1897–98.		Numbers of all Ranks borne on 1st January, 1898.
Vote 1	**For Her Majesty's Fleet**					
	Flag Officers	15		15		
	Commissioned Officers	3,317		3,214		
	Subordinate Officers	690		646		
	Warrant Officers	1,159		1,110		
	Petty Officers and Seamen	66,828		62,087		
	Boys (Service)	3,700		3,400		
			75,709		70,472	68,349
	Coast Guard.					
	Commissioned Officers	90		90		
	Chief Officers of Stations	236		233		
	Petty Officers and Seamen	3,874		3,877		
			4,200		4,200	4,115
	Royal Marines (for Service Afloat and on Shore).					
	Commissioned Officers	415		406		
	Warrant Officers	29		29		
	Staff Sergeants and Sergeants	1,283		1,236		
	Buglers and Musicians	604		574		
	Rank and File	15,476		14,596		
			17,807		16,841	16,792
	Total numbers available for Sea Service		97,716		91,513	89,256
	Net Increase in Numbers		6,203			

II.—Other Services.

Under which Vote Provided.	Ranks, &c.	1898–99.		1897–98.		1st January, 1898.
Vote 1	Naval Cadets	265		265		
	Engineer Students	184		189		
	Pensioners in Home Ships and in the Reserves	1,067		992		
	Boys under Training	6,000		6,000		
			7,516		7,446	7,171
Other Votes	Various Services	..	1,158	..	1,091	1,091
	Total numbers for other Services		(a)8,674		(a)8,537	8,262
	Net Increase in Numbers		137			
	Total, Sea Service	97,716		91,513		
	„ other Services	8,674		8,537		
			106,390		100,050	
	Net Increase		6,340			

	1898–99		1897–98
(a) Including Officers and Seamen	1,394	—	1,361
„ Pensioners (Vote 1)	1,067	—	992
„ Pensioners (other Votes)	15	—	20
„ Boys (Training)	6,000	—	6,000
„ Royal Marines	198	—	164
	8,674	—	8,537

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1899, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Two Million, Two Hundred and Eighteen Thousand Pounds.

(£2,218,000.)

SECTION II.—MATÉRIEL.—Two Million, Nine Hundred and Seventy-one Thousand Pounds.

(£2,971,000.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Five Million, Six Hundred and Twelve Thousand Pounds.

(£5,612,000.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

———	ESTIMATES.		Increase.	Decrease.
	1898-99.	1897-98.		
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances . . .	160,349	156,059	4,290	..
B.—Wages, &c., of Men, and hire of Teams	1,745,384	1,566,732 (b) 130,000	48,652	..
C.—Wages, &c., of Police Force . .	40,470	39,603	867	..
D.—Contingencies	6.070	5,785	285	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	57,348	56,091	1,257	..
F.—Wages, &c., of Men, and hire of Teams	207,948	172,693	35,255	..
G.—Wages, &c., of Police Force . .	12,416	11,022	1,394	..
H.—Contingencies	930	930	..	..
£	2,230,915	2,008,915 (b) 130,000	92,000	..
Deduct,—				
I.—Appropriations in Aid . . .	12,915	12,915	..	..
£	2,218,000	1,996,000 (b) 130,000	92,000	..
		Net Increase	. £92,000 (c)	

(a) These amounts include the sums of £9,116 and £1,052 for pay of Inspectors of Shipwrights at Home and Abroad respectively, which is charged direct to the cost of shipbuilding.

(b) Additional Estimate, 21 July, 1897.

(c) This Vote is decreased by a transfer of £6,689 to Vote 2 and increased by a transfer of £1,013 from Vote 1. The real increase is, therefore, £97,676.

NOTE.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£968,350
" 2	1,462,300
" 3	5,208,047
	£7,638,697

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

——	ESTIMATES. 1898–99.	ESTIMATES. 1897–98.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores.				
A.—Timber, Masts, Deals, &c. . .	170,000	105,000	65,000	..
B.—Metals and Metal Articles . .	1,500,000	1,000,000 (*a*) 40,000	460,000	..
C.—Coals for Yard purposes . . .	60,000	54,000	6,000	..
D.—Hemp, Canvas, &c.	129,000	90,000	39,000	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles. . .	422,000	250,000	172,000	..
F.—Electrical, Torpedo, and other Apparatus	165,000	90,000	75,000	..
G.—Coals for Steam Vessels . . .	605,000	525,000	80,000	..
H.—Freight.	41,000	41,000	..	..
I.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad . .	28,750	22,305	6,445	..
K.—Gas, &c., Dockyards at Home, and Naval Yards Abroad . . .	11,250	9,695	1,555	..
£	3,132,000	2,187,000 (*a*) 40,000	905,000	..
Deduct,—			*Add—*	
L.—Appropriations in Aid . . .	161,000	163,000	2,000	..
£	2,971,000	2,024,000 (*a*) 40,000	907,000	..
	Net Increase		. £907,000 (*b*)	

(*a*) Additional Estimate, 21 July, 1897.
(*b*) This Vote is decreased by a transfer of £4,490 to Vote 2. The real increase is, therefore, £911,490.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

——	ESTIMATES. 1898-99.	ESTIMATES. 1897-98.	Increase.	Decrease.
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for Her Majesty's Ships and Vessels	2,193,265	2,113,576 (*a*) 100,000	..	20,311
B.—Auxiliary Machinery for Her Majesty's Ships and Vessels	59,321	44,113	15,208	..
C.—Hulls of Ships, &c., Building by Contract	2,605,730	2,319,445 (*a*) 130,000	156,285	..
D.—Purchase of Ships, Vessels, &c.	..	..	..	..
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	96,440	101,600	..	5,160
F.—Inspection of Contract Work	52,000	50,000	2,000	..
G.—Gun Mountings and Air Compressing Machinery	519,084	535,766	..	16,682
H.—Machinery for Her Majesty's Shore Establishments at Home and Abroad	75,000	35,000	40,000	..
I.—Royal Reserve of Merchant Cruisers.	48,600	48,600	..	..
£	5,649,440	5,248,100 (*a*) 230,000	213,493	42,153
Deduct,—				
K.—Appropriations in Aid	37,440	38,100	..	660
£	5,612,000	5,210,000 (*a*) 230,000	213,493	41,493
	Net Increase		£172,000 (*b*)	

(*a*) Additional Estimate 21 July, 1897.
(*b*) This vote is decreased by a transfer of £1,260 to Vote 2. The real increase is, therefore, £173,260.

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET REPAIRS, MAINTENANCE, &c., VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1898–99.

SUB-HEADS under which this ESTIMATED EXPENDITURE will be accounted for in the NAVY EXPENSE ACCOUNTS, under the provisions of Sec. 1 (2), ARMY AND NAVY AUDIT ACT, 1889.

	ESTIMATED EXPENDITURE IN 1898–99.							1897–98.			Difference between Direct Expenditure, 1897–98 (B) and 1898–99 (A).	
	Direct Expenditure.											
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)		Establishment, &c., Charges, apportioned.	Aggregate, 1898–99.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1897–98.	Increase.	Decrease.
	Personnel, Sec. I.	Matériel, Sec. II.										
	£	£	£	£		£	£	£	£	£	£	£
NEW CONSTRUCTION:												
A.—DOCKYARD-BUILT SHIPS—												
Hulls, &c. (c)	847,370	1,419,530	262,121	2,529,021	1	262,127	2,791,148	2,040,700	259,486	2,300,186	488,321	..
Machinery	44,990	26,890	656,019	727,899	2	22,734	750,633	645,994	22,729	668,723	81,905	..
	892,360	**1,446,420**	**918,140**	**3,256,920**	3	**284,861**	**3,541,781**	**2,686,694**	**282,215**	**2,968,909**	**570,226**	..
B.—CONTRACT-BUILT SHIPS—												
Hulls, &c. (c)	71,140	60,980	2,839,389	2,971,509	4	65,630	3,037,139	2,637,419	68,470	2,705,889	334,090	..
Machinery	..	..	1,388,245	1,388,245	5	22,676	1,410,921	1,395,671	23,121	1,418,792	..	7,426
	71,140	**60,980**	**4,227,634**	**4,359,754**	6	**88,306**	**4,448,060**	**4,033,090**	**91,591**	**4,124,681**	**326,664**	..
C.—SMALL VESSELS (d)	4,850	4,900	62,273	72,023	7	1,584	73,607	71,259	1,342	72,601	764	..
TOTAL NEW CONSTRUCTION	**968,350**	**1,512,300**	**5,208,047**	**7,688,697** (f)	8	**374,751**	**8,063,448**	**6,761,043** (E)**400,000**	**375,148** ..	**7,166,191** (E)**400,000**	**897,654** (Net.) ..	.. **400,000**
											497,654 (Net.)	
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c.	568,650	295,000	252,025	1,115,675	9	113,175	1,228,850	917,810	105,973	1,053,783	167,865	..
E.—SEA STORES, COALS, &c.	..	1,160,000	13,220	1,173,220	10	43,292	1,216,512	1,102,251	58,888	1,161,139	70,969	..
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED	..	..	..	..	11	1,089,811	1,089,811	..	1,048,751	1,048,751	..	..
TOTAL	**1,537,000**	**2,967,300**	**5,473,292**	**9,977,592**	12	**1,621,029**	**11,598,621**	**8,841,104** (E)400,000	**1,588,760** ..	**10,429,864** (E)400,000		

NET INCREASE ON DIRECT EXPENDITURE . . £736,488.

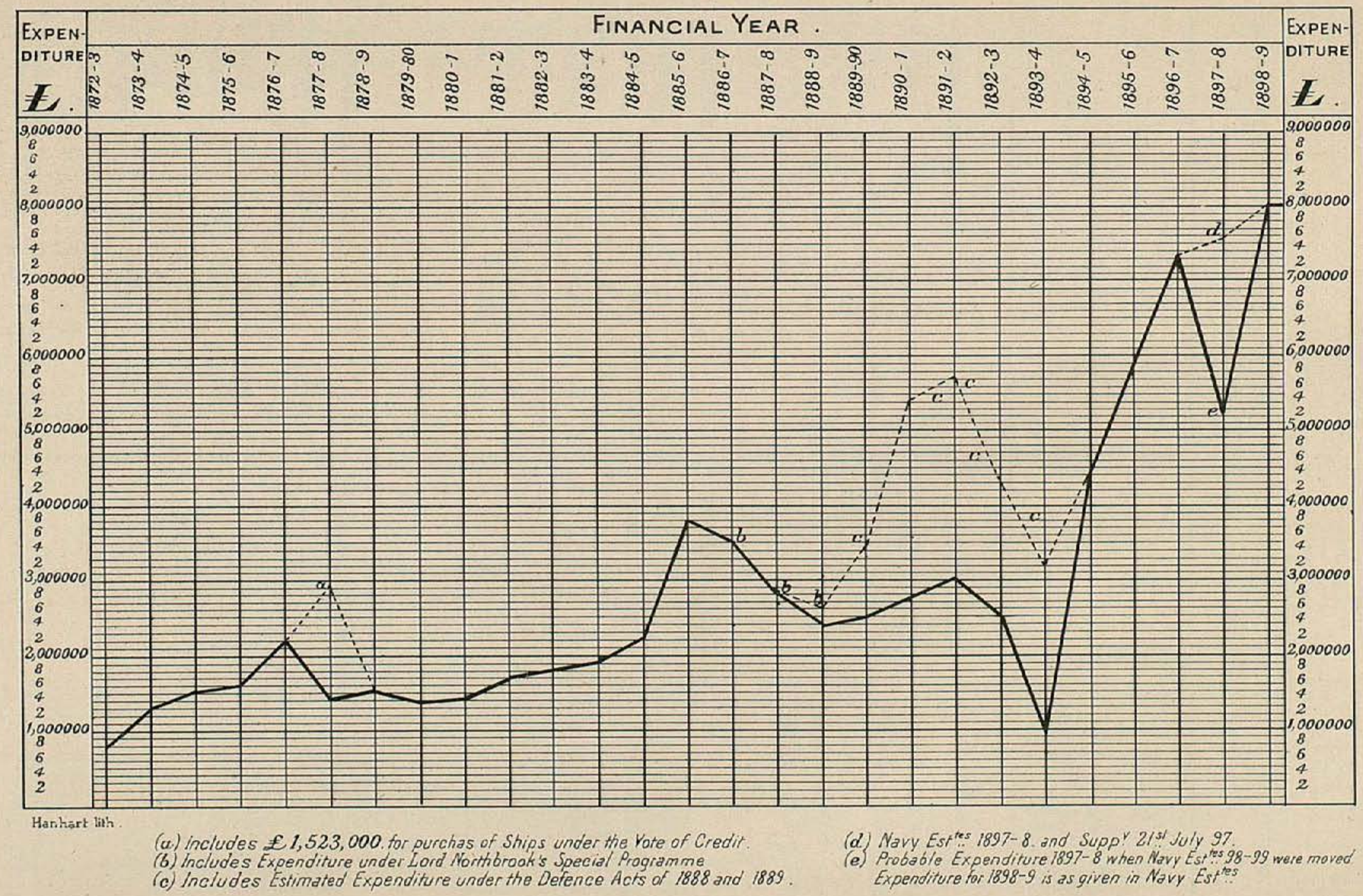
(c) Including Hydraulic and Transferable Gun Mountings, &c.
(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(f) Exclusive of £9,700 provided under Vote 2 for a new Tank Vessel for Royal William Yard, and the completion of No. 60 Victualling Lighter at Malta: also of £18,930 provided under Vote 9 for a new Store Steamer, and various small vessels for conveying Naval Warlike Stores.

(E) Additional estimate, 21st July, 1897, Parliamentary Paper, No. 329 (Personnel, £130,000, Matériel, £10,000, Contract Work, £230,000).

RECAPITULATION OF ESTIMATED EXPENDITURE.

HEADS OF EXPENDITURE.	ESTIMATED EXPENDITURE.		ESTIMATED DISTRIBUTION OF THE DIRECT AND INCIDENTAL EXPENDITURE.							
			Naval Construction.					Establishment and Incidental Charges Unapportioned to Ships, &c.		
				Re-construction, Repairs, Alterations, and Refits.						
	Charged direct as Incurred.	Establishment and Incidental Charges Apportioned.	New Construction.	Ships Re-constructing.	Ships for Reliefs, or Re-commission.	Ships in Commission and Reserve.	Stores for Ships, Coals for Steaming, &c.	Fleet, Port, National, and Unappropriated Charges.	Unappropriated Charges (Haulbowline, Deptford, and Naval Yards Abroad).	Total Amount of Estimated Expenditure.
	(a.)	(b.)	(c.)	(d.)	(e.)	(f.)	(g.)	(h.)	(i.)	(k.)
SUB-HEADS OF EXPENDITURE.			A., B., and C.	D.			E.	F.		
	£	£	£	£	£	£	£	£	£	£
SECTION I.—DOCKYARD WORK PERSONNEL .	1,537,000	844,583	1,150,335	..	248,309	388,193	28,961	387,306	178,479	2,381,583
SECTION II.—DOCKYARD WORK MATÉRIEL .	2,967,300	564,373	1,619,969	..	118,372	218,575	1,174,331	256,552	212,244	3,531,673
SECTION III.—CONTRACT WORK . .	5,473,292	212,073	5,293,144	..	125,651	129,750	13,220	55,230	..	5,685,365
TOTAL ESTIMATED EXPENDITURE for 1898-99 . . . . . . £	9,977,592	1,621,029	8,063,448	..	492,332	736,518	1,216,512	699,088	390,723	11,598,621
TOTALS OF SUB-HEADS £	11,598,621		8,063,448	1,228,850			1,216,512	1,089,811		11,598,621

DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 27 YEARS BETWEEN 1872-73 AND 1898-99.



Note _ The distance at any point of the drawn line from the base represents on the scale £s, the ORDINARY expenditure of the year marked by the point. The distance at any point of the dotted line (a, b, c.) from the base represents on the scale of £s, both the ORDINARY and the EXTRAORDINARY expenditure of the year marked by that point.

(a) Includes £1,523,000. for purchas of Ships under the Vote of Credit.
(b) Includes Expenditure under Lord Northbrook's Special Programme
(c) Includes Estimated Expenditure under the Defence Acts of 1888 and 1889.

(d) Navy Est[tes] 1897-8. and Supp[y] 21[st] July 97.
(e) Probable Expenditure 1897-8 when Navy Est[tes] 98-99 were moved. Expenditure for 1898-9 is as given in Navy Est[tes]

LIST of NEW SHIPS and VESSELS Estimated to be passed into the FLEET RESERVE during the Years 1898–99 and 1897–98.

1898–99.				1897–98.			
Name of Ship.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.	Name of Ship.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS:				**ARMOURED SHIPS:**			
Canopus	12,950	13,500	16	Hannibal	14,900	10,000	16
Ocean	12,950	13,500	16	Illustrious	14,900	10,000	16
Goliath.	12,950	13,500	16	Cæsar	14,900	10,000	16
				Mars	14,900	10,000	16
				Jupiter	14,900	10,000	16
PROTECTED SHIPS:				**PROTECTED SHIPS:**			
Andromeda	11,000	16,500	16	Terrible	14,200	25,000	14
Furious.	5,800	10,000	10	Arrogant	5,800	10,000	10
Gladiator	5,800	10,000	10	Dido	5,600	8,000	11
Vindictive	5,800	10,000	10	Isis	5,600	8,000	11
Diadem.	11,000	16,500	16				
Europa	11,000	16,500	16				
Niobe	11,000	16,500	16				
UNPROTECTED SHIPS:				**UNPROTECTED SHIPS:**			
Proserpine	2,135	5,000	8	Nil.			
Pomone	2,135	5,000	8				
Pegasus	2,135	5,000	8				
Pyramus	2,135	5,000	8				
Pactolus	2,135	5,000	8				
Perseus.	2,135	5,000	8				
Prometheus	2,135	5,000	8				
Torpedo Boat Destroyers No. 34 .	various.			Torpedo Boat Destroyers No. 21 .	various		

French Navy Estimates, 1898.

Cap. in French Estimates.	Heads of Expenditure.	Credits granted for the year 1898.*	Credits granted for the year 1897.
		£	£
	PERSONNEL.		
1, 2	Admiralty Office	130,692	125,685
3, 4	Navy Pay	1,710,100	1,669,993
5	Marines.	532,412	513,698
6	Gendarmerie Maritime	30,792	30,586
7	Inspection of Administrative Services .	10,212	10,044
8	Construction Staff	75,558	69,480
9, 10, 11	Administrative Staff, Commissariat, etc. .	266,932	262,932
12	Medical and Religious Staff . . .	87,600	83,308
13	Fisheries and Navigation . . .	28,552	25,428
	LABOUR.		
	Wages—		
14	Shipbuilding; new construction; fitting for sea	582,750	477,114
15	Shipbuilding; repairs	277,739	271,935
16	Armaments; construction of new guns .	129,670	45,987
17	Armaments; repairs	8,250	58,074
18	Works	36,843	36,776
19	Victualling	35,316	20,358
20, 21	Master-attendants' and Storekeepers' Departments	217,944	234,175
22	Miscellaneous	14,656	14,176
	MATÉRIEL.		
	Stores and Supplies—		
23	Admiralty	9,480	9,832
24	Shipbuilding in Dockyards . . .	1,666,544	1,467,089
25, 26	Shipbuilding by contract . . .	1,404,832	960,000
27	Fitting for sea; maintenance; repairs .	379,200	353,197
	Carried forward . .	£7,636,074	£6,739,867

* As passed by the Chamber. These are in excess of the credits proposed, and as they cause a deficit will probably be reduced by the Senate.

Cap. in French Estimates.	Heads of Expenditure.	Credits granted for the year 1898.	Credits granted for the year 1897.
		£	£
	Brought forward . .	7,636,074	6,739,867
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
28,29, 30	Repairs, conversions, &c., in dockyards and by contract	432,728	318,963
31	Armaments; new guns and conversions.	647,680	267,905
32	Armaments; powder, ammunition and repairs	72,400	405,934
33	Torpedoes	137,200	95,128
34	Works; new and large alterations. .	234,992	170,868
35, 36	Ditto, supplementary for defence of military ports	74,000	98,000
37	Works; repairs	56,920	55,080
38	Clothing	188,660	182,682
	Colonial Medal	—	800
39	Barracks	25,880	25,882
40	Victualling.	836,456	886,446
41	Medical, science, art and religion. .	107,780	64,897
42 to 46	Machinery	208,756	196,165
47	Fuel and lighting	29,720	31,299
48	Office furniture, etc.	44,056	39,834
	MISCELLANEOUS.		
49, 50	Travelling expenses and freight . . Allowance for lodging, etc. . . .	241,480	246,964
51	Charitable and subscriptions . . .	50,660	43,505
52	Fisheries and Commerce (materials for protection, etc.)	8,508	7,175
53	Pensions	446,776	424,256
54	Secret Service	3,200	800
55	Miscellaneous	1,400	24,240
	Total . . .	£11,485,326	£10,326,690

NOTE.—The above Estimates are converted at £1 = 25 francs. At the par rate of exchange, viz., £1 = 25·22 francs, the Credits for 1897 would amount to £10,236,607, and those for 1898 to £11,385,136.

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1898.—BUILDING IN DOCKYARDS.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Probable Date of Completion.	Total Estimated Cost.	Expenditure proposed for 1898.
					£	£
Battleships	Bouvet	Lorient	Jan. 1893	1897	1,083,469	32,237
	Charlemagne	Brest	July 1894	1897	1,058,340	136,920
	Saint-Louis	Lorient	Mar. 1895	1899	1,079,232	199,200
	Gaulois	Brest	Jan. 1896	1899	1,050,871	232,090
	Henri IV.	Cherbourg	..	..	801,323	222,480
	Jena (ex A 3)	Brest	..	..	1,136,385	233,104
	A 9	Brest	..	..	1,118,351	53,380
Armoured Cruisers, First-class	Jeanne d'Arc	Toulon	Oct. 1896	1900	962,951	305,825
	Dupetit-Thouars (ex C 3)	Toulon	..	..	808,600	144,117
	C 4	Cherbourg	..	..	808,600	82,663
	Gueydon (ex C 5)	Lorient	..	..	808,600	155,906
	C 7	Lorient	..	..	808,600	82,660
	Jurien de la Gravière (ex D 2)	Lorient	..	1901	480,940	130,690
	D 3	Rochefort	..	1901	429,128	65,601
Second-class Protected Cruiser	Cassard	Cherbourg	Oct. 1894	1897	314,288	14,313
Third-class Protected Cruisers	D'Estrées	Rochefort	Mar. 1897	1899	208,211	62,208
	Lavoisier	Rochefort	Jan. 1895	1897	202,093	17,137
First-class Sloop	Kersaint	Rochefort	Aug. 1896	1898	111,180	33,343
Torpedo-gunboats	Dunois	Cherbourg	Sept. 1896	1898	128,911	48,677
	La Hire	Cherbourg	..	1899	126,282	50,664
Gunboat	Décidée	Lorient	..	1899	54,109	30,630
Aviso-Transport	Vaucluse	Rochefort	May 1886	1899	83,056	3,840
Submarine Boat	Morse	Cherbourg	..	1898	31,580	19,213
First-class Torpedo-boats	No. 223	Cherbourg	..	..	17,542	7,130
	„ 224	Cherbourg	..	..	17,542	7,130
	„ 225	Toulon	..	..	17,542	7,130
	„ 226	Toulon	..	..	17,542	7,130
TOTAL BUILDING IN DOCKYARDS				£	13,765,268	2,385,418

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1898.—BUILDING BY CONTRACT.

Class.	Names of Ships.	Contractors.	Date of Contract.	Date of Completion.	Total Estimated Cost.	Expenditure proposed for 1898.
					£	£
Battleship . .	Masséna . . .	Soc. de la Loire	Various	1897	1,085,799	46,209
Armoured Cruisers First-class	D'Entrecasteaux	Soc. de la Méditerranée . .	Various	1897	673,649	93,994
	Montcalm . .	Not decided .	..	..	807,512	139,741
	C 8	Not decided .	..	..	807,512	49,000
	Desaix . . .	Not decided .	..	..	626,363	151,559
	Kléber . . .	Not decided .	..	..	626,363	151,559
Fast Cruisers .	Guichen . . .	Soc. de la Loire	Various	1898	620,576	195,436
	Châteaurenault .	Soc. de la Méditerranée . .	Various	1899	608,065	190,161
Second-class Protected Cruisers	Catinat . .	Soc. de la Méditerranée . .	Various	1897	324,694	18,622
	Protet . . .	Soc. de la Gironde	Various	1898	324,294	90,240
Third-class Protected Cruiser.	Infernet (ex K 2)	Tissier . . .	1896	1899	192,412	50,425
Torpedo Cruisers	Durandal . .	Normand . .	1896-7	1898	67,440	32,780
	Hallebarde . .	Normand . .	1896-7	1898	67,440	38,535
	Fauconneau . .	Normand . .	1897	1898	67,640	21,328
	Espingole . .	Normand . .	1897	1899	67,640	27,928
	Pique . . .	Soc. de la Méditerranée . .	1897	1899	69,509	28,636
	Epée	Soc. de la Méditerranée . .	1897	1899	69,509	28,636
	Framée . . .	Soc. de la Loire	1897	1899	69,509	20,636
	Yatagan . . .	Not decided .	..	..	69,509	20,636
Sea-going Torpedo Boats of 150 tons . . .	Cyclone . . .	Normand . .	1896-7	1898	37,903	12,680
	Nos. 12, 13, 14, 15 and 16 . .	Not decided .	..	..	189,613	31,420
First-class Torpedo Boats of 86 to 90 tons .	No. 206 . . .	Soc. de la Gironde	1896-7	1897	15,541	3,434
	No. 207 . . .	Soc. de la Gironde	1896-7	1897	15,541	3,434
	No. 208 . . .	Soc. de la Gironde	1896-7	1897	15,541	4,519
	No. 209 . . .	Soc. de la Gironde	1896-7	1898	15,541	4,531
	No. 210 . . .	Soc. de la Gironde	1896-7	1898	15,541	7,949
	No. 211 . . .	Soc. de la Gironde	1896-7	1898	15,541	9,809
	No. 212 . . .	Normand . .	1897	1898	17,641	9,946
	No. 213 . . .	Normand . .	1897	1898	17,641	9,946
				Carried forward	£7,601,479	1,493,729

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1898.—BUILDING BY CONTRACT—*continued.*

Class.	Names of Ships.	Contractors.	Date of Contract.	Date of Completion.	Total Estimated Cost.	Expenditure proposed for 1898.
					£	£
			Brought	forward . .	7,601,479	1,493,729
First-class Torpedo Boats, of 86 to 90 tons.	No. 214 . . .	Normand . .	1897	1898	17,641	9,946
	No. 215 . . .	Normand . .	1897	1898	17,641	11,482
	No. 216 . . .	Le Creusot . .	1897	1898	15,316	12,216
	No. 217 . . .	Le Creusot . .	1897	1898	15,316	12,216
	No. 218 . . .	Le Creusot . .	1897	1898	15,316	12,216
	No. 219 . . .	Le Creusot . .	1897	1898	16,321	10,683
	No. 220 . . .	Le Creusot . .	1897	1898	16,321	10,683
	No. 221 . . .	Soc. de la Loire .	1897	1898	16,840	13,740
	No. 222 . . .	Soc. de la Loire .	1897	1898	16,840	13,740
	No. 227 . . .	Soc. de la Méditerranée . .	1897	1898	16,809	8,569
	No. 228 . . .	Soc. de la Méditerranée . .	1897	1899	16,809	7,809
	No. 229 . . .	Soc. de la Méditerranée . .	1897	1899	16,809	7,809
	No. 230 . . .	Soc. de la Gironde	1897	1899	16,729	6,729
	No. 231 . . .	Soc. de la Gironde	1897	1899	16,729	6,729
	No. 232 . . .	Soc. de la Gironde	1897	1899	16,729	6,729
	No. 233 . . .	Le Creusot . .	1897	1899	16,769	10,409
	No. 234 . . .	Le Creusot . .	1897	1899	16,769	8,549
	No. 235 . . .	Le Creusot . .	1897	1899	16,769	6,709
Six Torpedo Boats of 85 tons	P. 55 to P. 60 .	Not decided . .	..	..	105,250	22,715
Steam-launch	Fourmi . . .	Soc. Dyle and Bacalau . .	Oct. 1896	1897	2,560	..
		TOTAL BUILDING BY CONTRACT . . . . £			8,007,762	1,693,407

German Navy Estimates, 1898–99.

(*Converted at £1 = 20·429 marks.*)

Ordinary Permanent Estimates.

——	Proposed for 1898–99.	Granted for 1897–98.
	£	£
Naval Cabinet and Chief Command Department	1,883	1,801
Imperial Naval Office	52,350	51,051
Observatories	14,190	14,187
Accounts	14,146	13,725
Martial Law	1,715	1,710
Divine Service and Schools	3,235	3,075
Military Personnel	702,110	646,196
Maintenance of the Fleet	658,921	641,017
Victualling	45,925	37,232
Clothing	13,038	12,553
Barrack Administration, Cashiers, and Accountants	101,314	97,796
Lodging Allowance	55,409	52,712
Medical	50,242	48,089
Travelling Expenses, Freight Charges, &c.	102,872	94,236
Training Establishments	10,574	10,353
Dockyard Expenses	885,507	865,593
Ordnance and Fortification	272,787	242,935
Accountant-General's Department	21,206	19,687
Pilotage and Surveying Services	23,713	22,756
Miscellaneous Expenses	34,468	32,421
Total £	3,065,605	2,909,125

Special Ordinary Estimates.

Shipbuilding Programme, 1898–1899.

For the Construction of—	£
Battleship, 1st class, Kaiser Friedrich III., 5th and final instalment	146,850
Cruiser, 1st class, Fürst Bismarck (Ersatz Leipzig), 4th instalment	195,800
Battleship, 1st class, Kaiser Wilhelm II. (Ersatz Friedrich der Grosse), 3rd instalment	286,357
Cruiser, 2nd class (large cruiser) M, 3rd and final instalment	134,613
" " " N, " "	134,613
" 4th class (small cruiser) G, " "	85,662
Battleship, 1st class, Ersatz König Wilhelm, 2nd instalment	250,624
Gunboat, Ersatz Hyäne, 2nd and final instalment	36,713
" Ersatz Iltis, " "	12,238
Battleship A, 1st instalment	97,900
" B, "	97,900
Large cruiser A, 1st instalment	97,900
Small cruiser A, "	48,950
" B, "	48,950
Gunboat, Ersatz Wolf, 1st instalment	24,475
" Ersatz Habicht, 1st instalment	24,475
One Torpedo Division boat, 1st instalment	42,733
Torpedo-boats, 1st instalment	88,110
For the renewal of engines and boilers, and alterations to hull of the 3rd and 4th ships of the Sachsen class, 3rd and final instalment	129,228
Total	£1,984,091

Summary.

——	Proposed for 1898–99.	Granted for 1897–98.
	£	£
Ordinary Permanent Estimates	3,065,605	2,909,125
Shipbuilding	1,984,091	1,854,961
Armaments and Torpedo equipments	552,107	596,848
Other Items	207,482	201,590
Extraordinary Expenditure	146,850	190,351
Total £	5,956,135	5,752,875

Italian Navy Estimates, 1898-99.

FINANCIAL YEAR, 1ST JULY, 1898, TO 30TH JUNE, 1899.

Converted at £1 = 26·46 lire.*

——	1898-9.	1897-8.
ORDINARY EXPENDITURE—GENERAL EXPENSES.	£	£
Admiralty	41,005	40,343
Pensions	180,990	180,990
Expenditure on various services connected with the Mercantile Marine	205,966	206,004
Total £	427,961	427,337
EXPENDITURE FOR NAVAL SERVICES.		
Ships fitting out	210,506	195,389
General Staff of the Navy	123,571	123,571
Corps of Constructors	49,008	45,238
Commissariat Service	34,498	34,089
Medical Service	25,265	25,265
Wages—Men	457,294	460,291
Gratuities	38,456	29,282
Assistants to Constructors and others	50,805	49,199
Accountants	53,478	52,192
Police	11,149	10,166
Telegraph Service	6,273	5,593
Telegraph Materials	6,992	6,992
Forts—*Personnel*	10,771	10,015
Provisions	279,667	263,794
Lighting	7,181	7,409
Hospital Services	18,518	18,132
Honorary Distinctions	453	529
Fuel and Stores	188,813	188,813
Salaries and Wages—Workshops and Fortifications	5,578	5,578
Training Establishments	15,949	14,059
Naval Academy	4,346	4,082
Scientific Services—*Personnel*	1,448	1,308
" " *Matériel*	10,166	10,639
Law Charges	1,209	1,209
Transport	22,676	22,676
Materials for repair of Ships	270,597	270,597
Carried forward £	1,904,667	1,856,107

* In last year's and preceding *Annuals* the lira was converted at £1 = 25 lire.

——	1898–9.	1897–8.
	£	£
Brought forward	1,904,667	1,856,107
Labour for same	210,397	210,397
Guns, Torpedoes and Small Arms	298,565	336,357
Labour for construction and repairs of Armaments	72,677	72,677
Works Department—Repairs	92,729	98,262
Construction and Completion of the following Vessels, viz.:		
Battleships: Ammiraglio di Saint-Bon, at Venice; Emmanuele Filiberto, at Naples		
2nd Class Cruisers: Vettor Pisani, at Naples; Giuseppe Garibaldi, by Messrs. Ansaldo; Varese, by Messrs. Orlando Bros.		
5th Class Cruiser: Puglia at Taranto	718,065	718,065
6th Class Cruisers: Agordat at Castellamare; and Coatit, at Naples; and another vessel		
Torpedo-boat Destroyers		
Sea-going Torpedo Boats		
Small Craft		
Total	£3,297,100	3,291,865

Extraordinary Expenditure.

	£	£
Half Pay	756	945
Mercantile Marine—Construction at Naples	—	1,890
Shipbuilding	18,896	18,896
Coast Defence	3,780	3,780
Torpedoes	18,896	22,676
Total. £	42,328	48,187
Depreciation of Ships in Commission	113,378	113,378
Rent of Lands occupied by Government	123,905	123,905

Summary.

	£	£
Effective Expenditure (Ordinary and Extraordinary)	3,767,389	3,767,389
Depreciation of Ships in Commission	113,378	113,378
Rent of Lands occupied by Government	123,905	123,905
Grand Totals	£4,004,672	4,004,672

Russian Navy Estimates, 1898.

CONVERTED AT £1 = 9·6 Roubles.

——	1898.	1897.
	£	£
Central Administration	188,484	190,249
Naval Schools	78,322	73,184
Medical	93,193	92,073
Shore Pay of Personnel	*455,683	432,803
Gratuities, Pensions, Education of Children	48,058	48,074
Clothing	189,740	184,985
Provisions	110,584	91,839
Maintenance of Fleet	1,165,039	1,235,811
Hydrographic Service and Lighthouses	102,140	77,530
Guns, Torpedoes, etc.	866,386	844,938
New Construction	†1,254,217	1,574,595 (New Construction and Repairs)
Repairs	723,636	
Workshops and Offices	467,454	391,499
Hire, Construction, and Maintenance of Buildings	418,179	459,598
Exchange on Sveaborg expenditure	7,667	6,391
Port Alexander III., Libau	385,981	333,333
Enlargement of Port of Vladivostock	312,500	—
Monument to Admiral Nahimoff	4,166	—
Expenditure on account of Estimates for 1898-9	23,964	19,061
Sundries	193,713‡	183,846§
Total £	7,089,106	6,239,809

* Includes £4772 for religious services.

† viz.:—

Hulls of Ships	467,604
Machinery	730,104
Armour	52,292
Reserve Fund of shipbuilding	4,217
	£1,254,217

‡ Includes £75,654 for travelling expenses.

§ Includes £62,500 for religious services.

United States Navy Estimates, 1898 and 1899.

Converted at £1 = \$4·86⅔ (*i.e.*, \$1 = $49\frac{5}{16}$*d.*).

Detailed objects of Expenditure and Appropriations.	Estimates, 1898.	Appropriations, 1898 (current Year).	Estimates, 1899.
General Establishment—	£	£	£
Pay of the Navy . . .	1,692,114	1,692,114	1,736,018
Pay, miscellaneous . .	61,640	61,640	61,640
Contingent Navy . .	1,438	1,438	1,438
Bureau of Yards and Docks—			
Ordinary Expenses . .	177,196	155,562	162,877
Public Works . . .	282,245	234,409	319,480
Bureau of Navigation—			
Ordinary Expenses . .	32,762	31,016	42,933
Naval Academy . . .	41,135	41,443	48,199
Bureau of Equipment—			
Ordinary Expenses . .	305,253	305,870	311,116
Naval Observatory . .	1,027	1,027	7,027
Bureau of Ordnance . . .	296,662	264,813	653,298
Bureau of Construction and Repairs	376,516	361,619	648,667
Bureau of Steam Engineering .	240,831	220,447	—
Bureau of Supplies and Accounts	313,429	518,897	313,429
Bureau of Medicine and Surgery.	28,190	30,245	31,149
Marine Corps—			
Pay Department . . .	156,779	157,007	165,334
Quartermaster's Department.	68,698	68,698	65,526
Total running Expenses .	4,075,915	4,146,245	4,568,131
Increase of the Navy—			
Bureau of Equipment . .	47,797	33,415	44,176
Bureau of Ordnance . .	1,586,382	1,483,647	874,228
Construction and Machinery	1,320,211	1,320,211	815,808
Training Vessel for Naval Academy . . .	—	25,684	—
Total increase of the Navy	2,954,390	2,862,957	1,734,212
Grand Total . . .	£7,030,305	£7,009,202	£6,302,343

INDEX.

A.

C.

D.

G.

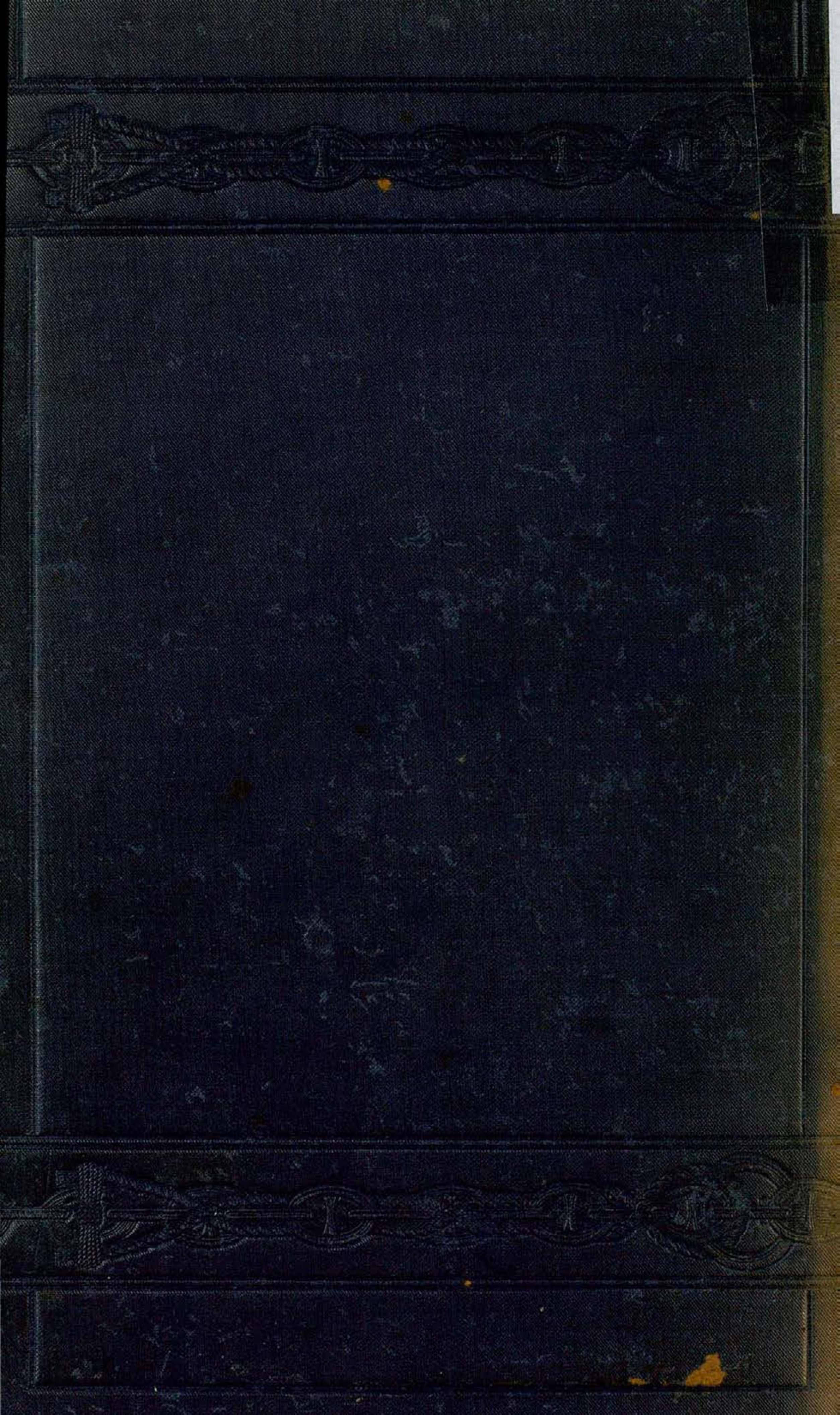
H.

I.

N.

O.

LONDON: WILLIAM CLOWES AND SONS, LIMITED, STAMFORD STREET, AND CHARING CROSS.



T. A. BRASSEY

1898

J. GRIFFIN & Co.
PORTSMOUTH

THE NAVAL ANNUAL

T. A. BRASSEY

1898

TWELFTH YEAR OF PUBLICATION

J. GRIFFIN & Co. PORTSMOUTH